RAILROAD GAZETTE

FRIDAY, FEB. 9, 1894

## CONTENTS.


| ILLUSTRATIONS: | PAGE. |
|---|---|
| Burnside Shops of the Illinois Central | 96 |
| Wengern-Alp Rack Railroad, Switzerland | 98 |
| Metal Underframes for Freight Cars | 102 |
| Revolving Angle Iron Shear | 103 |
| Gold's Improved Steam Trap | 103 |
| Phœnix Iron Co.'s Testing Machine | 104 |
| A Sharp Curve in the Grand Central Yard | 105 |
| CONTRIBUTIONS: | |
| Thankfulness for the Absence of Signals | 95 |
| English and American Signaling Practice | 95 |
| The Mechanical Engineers' Monthly Meeting | 95 |
| EDITORIALS: | |
| Compound Locomotive Tests on the Long Island Railroad | 106 |
| The Altoona Air-Brake Tests | 106 |
| Erie Finances | 107 |
| Train Accidents in 1893 | 107 |
| Shippers' Objections to the Official Freight Classification | 108 |
| Some World's Fair Traffic Experiences | 109 |

| | PAGE. |
|---|---|
| EDITORIAL NOTES | 106, 110 |
| New Publications | 110 |
| Trade Catalogues | 110 |
| GENERAL NEWS: | |
| Locomotive Building | 112 |
| Car Building | 112 |
| Bridge Building | 112 |
| Meetings and Announcements | 112 |
| Personal | 112 |
| Elections and Appointments | 113 |
| Railroad Construction | 113 |
| General Railroad News | 114 |
| Traffic | 114 |
| MISCELLANEOUS: | |
| Technical | 110 |
| The Scrap Heap | 111 |
| Compound Locomotive Tests on the Long Island Railroad | 95 |
| Railroad Bridges in Massachusetts | 95 |
| The Use of Iron and Steel in Car Construction | 96 |
| Air-Brakes and Their Maintenance | 100 |
| Metal Underframes for Freight Cars | 102 |
| Chicago Traffic Matters | 103 |
| English Tests of Car Axles | 104 |
| Industrial Conditions in Mexico | 104 |
| Foreign Railroad Notes | 105 |


## Contributions.

### Thankfulness for the Absence of Signals.

CLEVELAND, O., Feb. 3, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the communication from E. S. C. in your issue of Feb. 2, suppose that the Hackensack drawbridge had been provided with the latest improved signaling appliances, interlocked so that the home and distant signals could not possibly have shown clear unless the draw was closed. Was it not closed, and would not the distant signal, if indicating anything to the following train, have said "bang ahead, sir, the road is yours?" Should we not rather be thankful that, in the absence of a block system on the D., L. & W., the Hackensack drawbridge was *not* provided with distant signals? A. M. M.

[We ought to be thankful that there was no distant signal if its presence would lead a train into danger; but a fixed signal should be set at danger immediately after the passage of the front portion of every train that traverses the track which the signal governs; then it would not lead into danger. This is the practice even where there is no block system. If, as is sometimes the case where a drawbridge remains closed all winter, there is no signalman on duty and the signal is fastened at "all clear" and remains in that position for several days or months, it would be the duty of the engineman to bear in mind that the injunction to "bang ahead" was subject to important limitations; that the signal referred to the bridge (or switch) alone, and not to the occupancy or non-occupancy of the track by a train. Not only would this be the runner's duty; it is a duty which he ought to easily remember, for he would have frequent illustrations, in actual practice, showing that the fastened signal did not indicate a clear track.—EDITOR RAILROAD GAZETTE.]

### English and American Signaling Practice.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have no desire to volunteer as a defender of the Union Switch and Signal Company, and I am quite prepared to agree with Mr. Arthur H. Johnson that it would be a help (or at least a matter of interest) if we could have a consensus of opinion from competent signal experts on matters of signaling. It is the common criticism of expert testimony that it is given in the spirit of the advocate, and that, I think, may fairly be urged against Mr. Johnson's opinion which you published on Jan. 15.

I examined with a good deal of interest the new interlocking at Waterloo Station, London, while it was in process of erection, and when it was far enough advanced for the signalmen to be at practice in the tower, or as it is generally called the "A box." Disclaiming any qualifications as an expert, it seemed to me that Mr. O'Donnell only secured by his "Simplex" device located inside the tower the results we have here long obtained by selectors located outside the tower. I think it has been the experience of most of us that the use of selectors was carried altogether too far, and they are now much less frequently introduced. I thought in looking at the O'Donnell device that our cousins were about to purchase their knowledge at the same school where we bought ours.

But what I wish principally to call attention to is the apparent attitude of Mr. Johnson's mind, while testifying as an expert, in claiming the movement of the six-track road terminating at Waterloo to be more easily worked than the movement on the five lines crossing each other with the 14 tracks at Stewart avenue, Chicago. The fact is that there is about as much likeness in the two situations as "there is between an oyster and a feather bed," to use one of DeWolf Hopper's expressions.

There is one great advantage of pneumatic over lever machines, with their above-ground wire and pipe-line connections, that Mr. Johnson discreetly passes over, and which I think is not usually sufficiently emphasized. I thought it was quite happily brought out by an English officer in speaking of the latter: "Oh! but we do smash 'em up so when we leave the metals." F.

### The Mechanical Engineers' Monthly Meeting.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It was quite natural that the members of the American Society of Mechanical Engineers should desire something more practical for the object of their monthly gatherings than the series of sociables which has been in vogue for the past two or three years. The movement recently set on foot has indicated, through the interest shown in the first monthly meeting, that there is an existing desire to meet as frequently as once a month for the purpose of exchanging experiences.

In the effort to divest such meetings of any official character, however, there is danger of wasting much valuable material and also of depriving distant members of one of the principal advantages they are supposed to derive from a society of this character. The legitimate channel through which members, wherever located, should be apprised of the technical proceedings is the published Transactions of the Society. However fully they may be reported if they are scattered through the columns of various periodicals their permanent value is greatly diminished because they are not readily accessible. The supposition that such meetings if given an official character would arouse opposition from members who are deprived of the opportunity of attending them is largely fallacious. If the membership of a society was restricted to those who attend meetings, or even who would attend if they had the privilege, its usefulness would be largely diminished by reason of its decreased income. If the proposed monthly meetings possess any merit whatever, it will be largely due to the character and experience of those who attend them, and it is necessary to add that mechanical engineers everywhere will be interested in the discussions. If the meetings are worth holding they are worthy of permanent record. It may be said that it is this very informal character which makes the proceedings of interest, and that participants are less restrained than if their remarks were to be printed. As it is, however, they are reported for the technical papers, but not as carefully and probably not as fully as they would be in the official Transactions.

Experience will no doubt show that the papers or subjects brought forward at monthly meetings of this character will be more fully discussed than at the official meetings of the Society, because there is more time for that purpose, while as was suggested at the first of the monthly meetings it is not conducive to their success that there should be a sudden change of subject. The notion that the actual physical presence of members at meetings is essential to maintain their personal interest in the Society should be discarded. Every organization of this kind has upon its rolls hundreds of members who continue year after year without attending a meeting. They are, however, interested in its doings, and if deprived of the privilege of reading verbatim reports of meetings, they will eventually object to the proposed practice of "unofficial meeting of members."

ENGINEER.

### Compound Locomotive Tests on the Long Island Railroad.

We give below a report on a series of tests of Baldwin compound and simple ten-wheel locomotives on the Long Island Railroad, made by Mr. Charles M. Jacobs, Consulting Engineer, assisted by Mr. J. V. Davies. The object of the test was to determine the relative economy of the two types of engines. The principal dimensions of the locomotives are given below, the only difference being in the cylinders and valve gear.

| | |
|---|---|
| Weight in drivers | 78,700 lbs. |
| Weight on leading trucks | 27,450 " |
| Total weight of engine | 106,150 " |
| Weight of tender | 67,000 " |
| Diameter of drivers | 60⅝ in. |
| Cylinder diameter, simple | 18 in. |
| " " compound | 12 & 20 in. |
| Stroke of piston | 24 in. |
| Type of boiler | Wagon top |
| Diameter of shell | 54 in. |
| Number of tubes | 200 |
| Outside diameter of tubes | 2¼ in. |
| Length of tubes | 140 in. |
| Heating surface, tubes | 1,216.75 sq. ft. |
| " " firebox | 126 " " |
| " " total | 1,342.75 " " |
| Grate area | 22¼ " " |
| Diameter of exhaust tip | 3½ in |

The engines were Compound engine No. 145 and Simple engine No. 138, built by Burnham, Williams & Co., 1893. Both had been in the shops for general repairs at a late date, and were in equally good running condition.

All coal was weighed on and off from point of start to return to that point, and the water consumption was measured with Thompson patent water meters attached to the injector or suction pipes; the work on each day was the same. On the first day's run with each engine the flue tubes and grates and front end were all perfectly clean, and on all succeeding days all conditions were similar.

Each day's run for consumption was reckoned only from the time of starting with the train, and each day was concluded exactly at the point of origin, the fires being brought up to level as at starting, and the water in boiler being brought exactly up to the level of top cock. The same engineer and fireman were retained for the whole series.

All weather conditions were adverse to the compound engine; as one day (Nov. 4) was exceedingly wet, and on the succeeding day the coal was still soaking. The resultant economy, it will be seen, is figured up at 37$\frac{2}{10}$ per cent. in coal, and 17$\frac{1}{2}$% per cent. in water, on the simple basis of *per car per mile;* but making allowance for the increased length of terminal stoppages with the simple engine, the economy per car per mile *per hour* was 32$\frac{1}{10}$ per cent. in coal and 10$\frac{7}{10}$ per cent. in water, each in favor of the compound engine.

CONDITIONS OF TESTS.

Coal used on all days—Moshannon Clearfield coal.
Condition of engine and fires—Ordinary working conditions.
Train hauled, No. of cars—20.
Train hauled, gross weight, tons—819.
Train hauled, tare weight, tons—255.
Train hauled, net weight tons—564.
Mileage, course—Hempstead Crossing & Ronkonkoma and return twice daily.
Mileage, total daily—113.78.

The average weight of coal used per train mile is, with compound 54.4 lbs., and with the simple locomotive 86.8 lbs. The sparks drawn from the front end of the compound locomotive amounted to but about one-third of those drawn from the simple locomotive.

### Railroad Bridges in Massachusetts.

The annual report of the Massachusetts Railroad Commission was summarized in the *Railroad Gazette* of Feb. 2. That part of it made by Mr. George F. Swain, Bridge Engineer, omitted last week, contains the following:

Only 5 out of 17 railroads or divisions have complied with the law and made reports of inspection of their bridges by competent engineers. The reorganization and the consolidations which have occurred are doubtless the reasons why some of the inspections have not yet been made and reports submitted. On the Boston & Maine and on the New York, New Haven & Hartford the oversight of all bridges has during the past year been transferred from the chief engineer or bridge engineer to the division superintendents, and the chief engineer, being relieved of the direct supervision of bridges, unless specially ordered to do so, made no inspection; while, on the other hand, the division superintendents were not aware of the requirement of the law.

A table is presented of bridges which have been renewed or repaired to any considerable extent during the past year, and also during the past six years. The condition of the bridges is being improved steadily, and the amount of new work done each year in repairing and renewing is smaller. Considerable has been done in building new bridges necessitated by the work of abolishing grade crossings. On the Boston & Albany more bridgework has been done during 1893 than during any other year since 1887. The number of railroad bridges in

| | Vauclain compound No. 145. | | | | Simple No. 138. | | | |
|---|---|---|---|---|---|---|---|---|
| | Nov. 3. | No. 4. | Nov. 5. | Average. | Nov. 6. | Nov. 7. | Nov. 8. | Average. |
| Coal consumed, lbs. | 5,687 | 6,303 | 6,607 | 6,199 | 9,502 | 9,835 | 10,289 | 9,875 |
| Water evaporated, lbs. | 43,104 | 45,591 | 47,457 | 45,384 | 52,820 | ..... | 57,101 | 54,961 |
| Evaporation, lbs. of water per lb. of coal | 7.57 | 7.23 | 7.18 | 7.32 | 5.55 | ..... | 5.55 | 5.55 |
| Running time | 4 h. 18½ m. | 4 h. 7 m. | 4 h. 6 m. | 4 h. 11 m. | 4 h. 19½ m. | 4 h. 32 m. | 4 h. 32 m. | 4 h. 28 m. |
| Stops, time | 1 h. 14½ m. | 1 h. 10 m. | 1 h. 2 m. | 1 h. 9 m. | 1 h. 8½ m. | 1 h. 26 m. | 1 h. 19 m. | 1 h. 18 m. |
| No. of stops other than nominal | 1 | 2 | 0 | ..... | 1 | 2 | 0 | ..... |
| Total time with train | 5 h. 33 m. | 5 h. 17 m. | 5 h. 8 m. | 5 h. 19 m. | 5 h. 28 m. | 5 h. 58 m. | 5 h. 51 m. | 5 h. 45 m. |
| Total time, engine using steam | 3 h. 47 m. | 3 h. 46 m. | 3 h. 46 m. | 3 h. 46 m. | 3 h. 55 m. | 3 h. 52 m. | 3 h. 39 m. | 3 h. 48 m. |
| Total time, safety valve blowing off | 17 m. 25 s. | 20 m. 30 s. | 5 m. 5 s. | 14 m. 20 s. | 24 m. 45 s. | 4 m. 45 s. | 1 m. 10 s. | 10 m. 13 s. |
| Injector feeding regularly—No. of applications | 7 | 10 | 15 | 10⅔ | 10 | 13 | 15 | 12⅔ |
| Average steam pressure | 169.5 | 170.25 | 160.4 | 166.7 | 130.1 | 123.9 | 124 | 126 |
| Safety valve set to blow off at | 180 | 180 | 180 | 180 | 145 | 145 | 145 | 145 |

the state over 10 ft. in span at the end of 1892 was 1,694 and at the end of 1893, 1,698. Forty-eight new bridges have been built during the year; 15 are new bridges where none existed before, and 33 are bridges rebuilt. Of the 15 new structures 10 are on the Boston & Albany.

On the Boston & Albany there has been very little increase in the weights of engines used since 1887. In 1887, the heaviest engine weighed 120,000 lbs., with 26,250 lbs. on a driving axle; in 1892, the heaviest engine weighed 130,000 lbs., with 29,675 lbs. on a driving axle. In 1893, two engines were procured, one of which was wrecked in the Chester disaster, weighing 132,300 lbs. each, or but little more than existing engines, but carrying 35,934 lbs. on a driving axle, or about 17 per cent. more than other engines in use. Out of 256 bridges on this road, 20 were built new, and 20 were strengthened, in 1893.

On the Boston & Maine 14 spans have been rebuilt and three strengthened during the past year. The most important work has been the renewing of the old wooden bridge at Lawrence and the rebuilding of the jack-knife drawbridges at Boston.

Professor Swain calls attention to the dangers arising from the use of so-called jack-knife drawbridges, in which the rails are supported directly upon the chords, without any floor whatever, and the consequences which would ensue if a derailed train were to approach such a bridge. There are in the state 20 of these bridges, 3 on the Old Colony, 11 on the Boston & Maine, 1 on the New York & New England, 4 on a freight branch of the Boston & Albany, and 1 on the Fitchburg. Professor Swain has recommended to the Old Colony the renewal of two jack-knife draws over which trains pass at considerable speed, and he expresses the opinion that jack-knife draws are only allowable close to a terminal station, where all trains will run over them slowly.

Rolling stock continues to grow heavier. On the Old Colony the heaviest engine in use in 1887 weighed 97,840 lbs.; the heaviest load on one axle was 31,605 lbs. Now the heaviest engine on this road weighs 128,780 lbs., or 44,150 lbs. on one driving axle, an increase of over one-third in the load on an axle above that of 1892. Another engine on the same road, introduced in 1893, weighs 117,000 lbs., carrying 37,000 lbs. on one axle, and this engine runs in Massachusetts. These figures will render apparent the necessity for constant oversight of the bridges.

In his report of the bridge accidents during the past year, he mentions the catastrophe on the Boston & Albany at Chester, Aug. 31, described in the *Railroad Gazette*, p. 663 *et seq.* The disaster was not due to any fault of construction, or to any defect in the floor system or in the track. It was due entirely to the fact that the bridge was being strengthened and had been left temporarily in an unsafe condition. In regard to the proper methods of strengthening railroad bridges, Professor Swain, after describing how the repairs were being made, for which see *Railroad Gazette*, p. 688 *et seq.*, 1893, says:

> It will be evident to every engineer that this work, if properly done, could be carried on with safety; and, in fact, the circumstance that many other bridges had been repaired in this way indicates this. This method, however, has certain disadvantages.
>
> In the first place, it is to be noticed that the new plates are added to the structure while it is carrying its own dead weight, which, including that of the floor, is a considerable proportion of the total weight which it has to carry. The new plates or other pieces, therefore, will not, after they are added, help support anything but the live load; and they will not therefore be strained equally with the old pieces. In the second place, to carry on work in this way necessitates temporarily weakening the structure to a greater or less degree.
>
> Both of the objections mentioned will be overcome if, before such work of strengthening is begun, the whole structure be supported upon scaffolding, which is wedged up in such a way as to carry not only the live load, but the dead load of the bridge itself. In my judgment, therefore the best and most satisfactory manner of carrying on such repairs is, where practicable, by the use of scaffolding which will support the bridge while the repairs are being made. If the work is carried on in this way, any temporary weakening of the old structure is of no consequence, because it is not carrying the load.

This latter recommendation gives, in fact, the only proper way to repair such a bridge. It will be noted that Professor Swain agrees very fully with our own opinions, as expressed in the issue of Sept. 15.

## The Illinois Central Shops at Burnside.

As the readers of the *Railroad Gazette* are probably well aware, the Illinois Central Railroad Company has during the past two or three years spent considerable money in building and equipping new locomotive shops near Chicago. The requirements of the company long since outgrew the old Weldon shops below Fourteenth street, and the space occupied by them was needed for other purposes. The new shops are located at Burnside Station, 12 miles south of the Randolph street terminal and two miles north of Pullman, on the main line of the road and west of the tracks on a tract of several hundred acres acquired some time ago by the company. The shops are so placed as to provide for future extensions and for the car shops, which will doubtless be moved to this point from Twenty-seventh street as soon as the change can be conveniently made.

Our engraving shows the plan of the shops and roundhouse and their location with reference to the main tracks.

The roundhouse contains 40 stalls and is 316 ft. in outside diameter. The turntable was built by the Lassig Bridge & Iron Works of Chicago, and is 65 ft. long. The roundhouse is heated by direct steam, the pipes being placed in the side of the pits. The pits are floored with cement and drain inwardly to a trench 30 in. wide, which extends around the complete inner circle of the house and leads to a catch basin located just outside of the building and near the track which leads to the building from the ash pit. From this catch basin the water used in washing out boilers passes through the 8-inch pipe leading around the east side of the roundhouse to a sump 25 ft. in diameter and 25 ft. deep, shown on the south side of the building. On its way to the sump it passes through two catch basins in which the greater part of the sediment is deposited. A 14 by 7 by 12-in. Laidlaw & Dunn pump in the roundhouse draws the water from this sump and pumps it through a large feed water heater into the pipes from which the water for washing boilers is drawn. The water can thus be used several times and is used in the boilers at a temperature of about 160 deg.

A considerable part of the water now used is from the city mains. A 6 in. driven well at the tank shown a short distance southwest of the boiler house furnishes the rest of the water needed, and an 8-in. well is now being put in near by. It is thought that the two together will furnish all the water required.

The boiler house is 108 ft. 4 in. long, 68 ft. 4 in. wide and at present contains six 18 ft. return flue tubular boilers 72 in. in diameter, arranged in batteries of two each. From these boilers steam is supplied for power and heating purposes for the whole plant. Steam is piped from the boiler house to all the buildings of the plant. The steam pipe where it leaves the boiler is 16 in. in diameter and is reduced in size as branches are taken off to the different shops. It supplies steam to a 150-H. P. Bullock-Corliss engine, and a 100-H. P. Ideal engine in the engine room, to a 25-H. P. Westinghouse engine in the boiler shop, and to all pumps and houses about the plant. The pipe is carried above ground and protected by asbesto-sponge covering, and is also boxed in where exposed to the weather. The length of pipe from boiler to machine shop engine room is about 1,000 ft., a sufficient number of bends being made to avoid the use of expansion joints. The drop in steam pressure between the boiler and engines in the machine shop when running at full capacity is about 7 lbs.

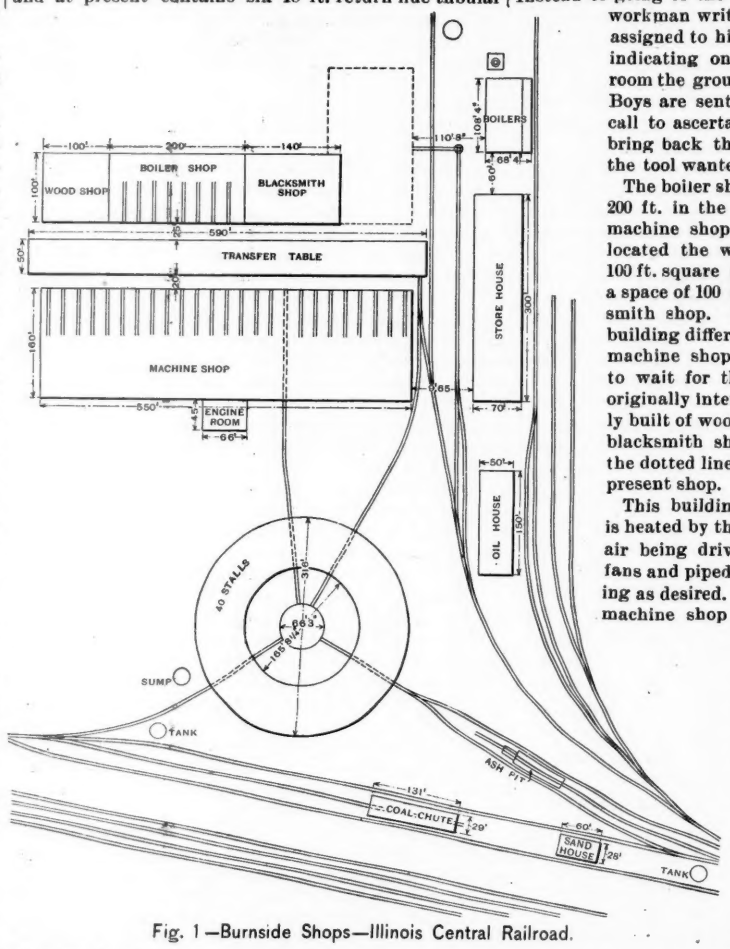



Fig. 1.—Burnside Shops—Illinois Central Railroad.

The machine shop is 550 ft. long, 160 ft. wide and is shown in sectional elevation in fig. 2. The roof has a pitch of 1 in 2, and is covered between the three lower purlines of each truss with slate laid upon 1⅛ in. sheathing. Between the ridge and the upper purlines are skylights. The rafters are 2 × 10 in. in section, laid 20 in. from center to center and carried by lattice purlines shown in fig. 3. The roof trusses, shown in detail in fig. 4 are spaced 22 ft. apart and carry only the weight of the roof, all shafting being carried by the second floor girders shown in the left half of fig. 2. In this section are placed all the machine tools and on the opposite side of the shop are the locomotive pits. The second floor structure is used at present only for carrying the shafting, but it is the intention to ultimately floor this over and place upon it the lighter tools, in case the work increases to such an extent as to warrant it. The girder between the central posts is not yet in position. The central posts of this structure, as well as those in the center of the building, which support the inner ends of the roof trusses, are of Z bar section. The second floor structure is connected longitudinally by plate girders, shown in fig. 5, and the main posts by the lattice work shown in fig. 6. Expansion and contraction are provided for by slotted holes in the connections in one end of alternate girders and lattice work, and by expansion bearings upon the wall at the outer end of the roof trusses.

There are two lines of shafting supported from the second floor girders, the east line being driven direct from the Bullock-Corliss engine, and the second line of shafting is driven from the first by a rope drive. The short section of shafting upon which these main pulleys are placed transmit power to the line shafting at each end through friction clutches.

The runway for the traveling crane shown in the right hand section of fig. 2 is not yet in position. The posts and girders for this structure are shown in figs. 7 and 8. There are 25 locomotive pits in this shop and 8 in the boiler shop opposite. The floor of the machine shop is divided into groups, each group connected electrically with the tool room, which is located on the east side of the building and south of the engine room. Instead of going to the tool room for tools needed, a workman writes his number on a blackboard assigned to his group and presses a button, indicating on an annunciator in the tool room the group from which the call is made. Boys are sent out from the tool room upon call to ascertain what tool is wanted and to bring back the check of the workman for the tool wanted.

The boiler shop occupies a space of 100 × 200 ft. in the building directly west of the machine shop. South of the boiler shop is located the wood shop with a floor space of 100 ft. square and north of the boiler shop in a space of 100 × 140 ft. in area is the blacksmith shop. The roof construction of this building differs considerably from that of the machine shop. It was found impracticable to wait for the iron work, which it was originally intended to use; it was consequently built of wood. It is the plan to extend the blacksmith shop to the limits indicated by the dotted lines at the north and west of the present shop.

This building as well as the machine shop is heated by the Sturtevant hot air system, air being driven through large heaters by fans and piped to various parts of the building as desired. Between these shops and the machine shop is a transfer track 590 ft. long upon which is operated a 50 ft. transfer table built by the Industrial Works, of Bay City, Michigan. This table has a capacity of 75 tons and is operated by a 20 H. P. Thomson-Houston motor. Current is supplied by two overhead trolleys. The transfer table has an attachment for hauling on and off operated by the motor, and has two speeds, one for heavy loads of 100 ft. per minute, and one for light loads of about 300 ft. per minute. The table runs on three tracks of 4 ft. 8½ in. gage.

The storehouse is 300 ft. in length and 70 ft. wide, and is located north of the shops and directly east of the boiler house. This is a two-story structure and well lighted, and affords ample space for the requirements of the shops. East of this is the oil house, 50 ft. in width and 150 ft. in length. Oil is stored in the basement or cellar and is forced to the main floor by means of air pressure on the tanks below. As will be seen by reference to the plan, space enough is left south of the present roundhouse for another of equal capacity.

## The Use of Iron and Steel in Car Construction.

The discussion on the above-named paper, read by Mr. J. D. McIlwain at the December meeting of the Western Railway Club, was taken up at the regular monthly meeting of the Club on January 16.

In reply to a call by President Forsyth on Mr. Lewis, as to the difficulty of taking the journal boxes out of Fox pressed steel trucks, Mr. Lewis said: I think perhaps this is a small objection, but with a more general introduction of the trucks proper facilities would enable this work to be done cheaply and quickly. The practice will be to put in drop tables so that the wheels could be removed without jacking up the cars. There are advantages in the use of this truck which will more than offset any increase of labor in changing wheels. In the construction of the truck there are no hangers nor swing beams nor working joints, and with a reduction

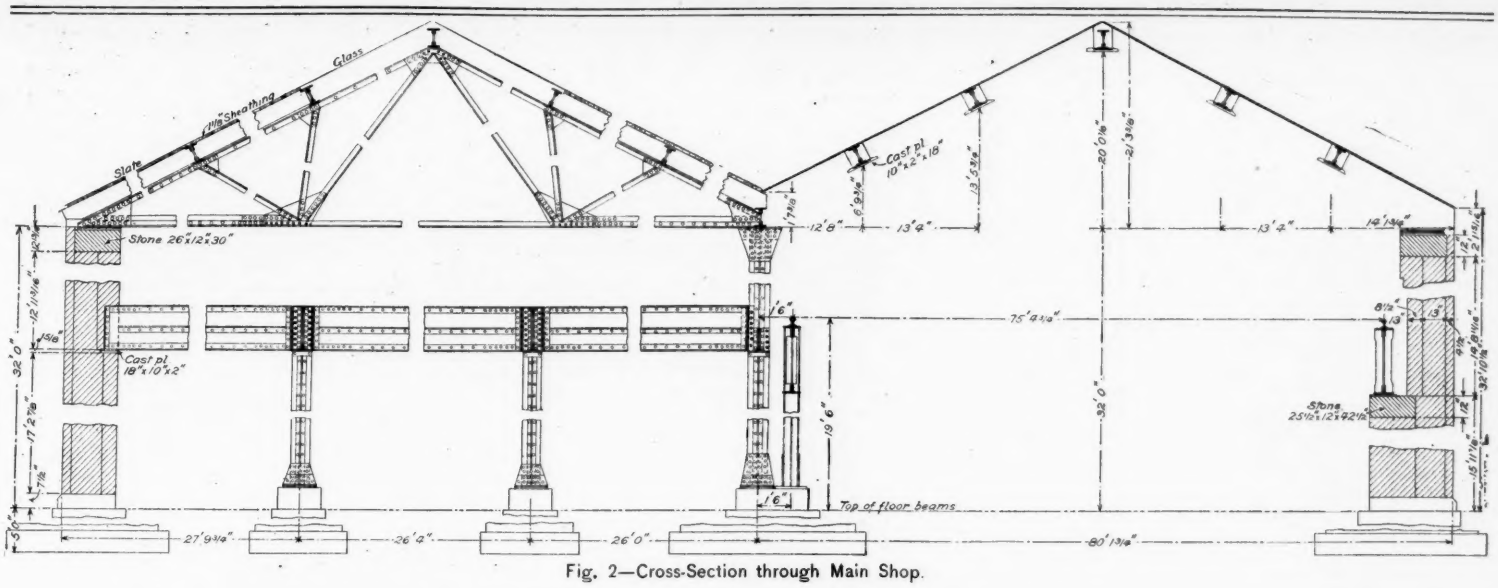



Fig. 2—Cross-Section through Main Shop.

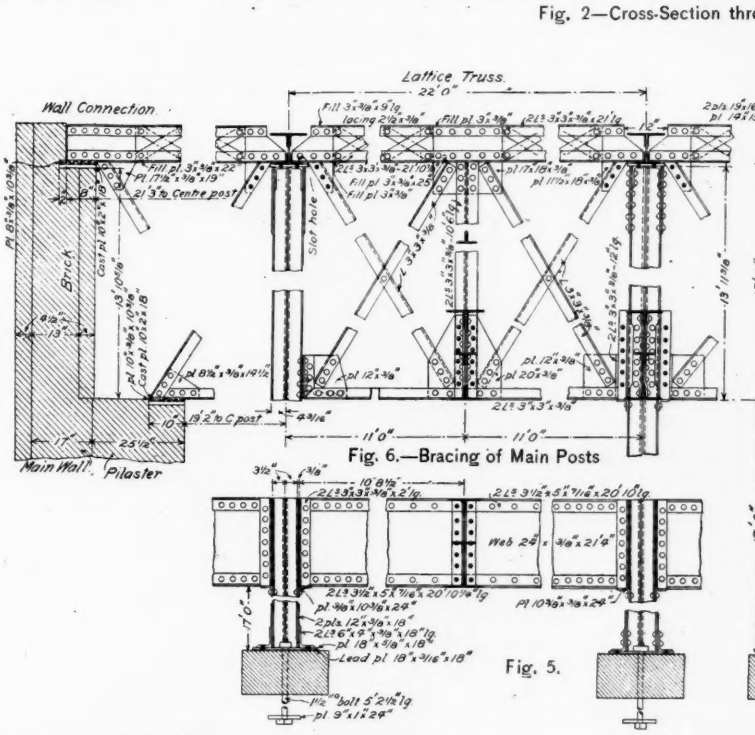



Fig. 6.—Bracing of Main Posts




Fig. 5.

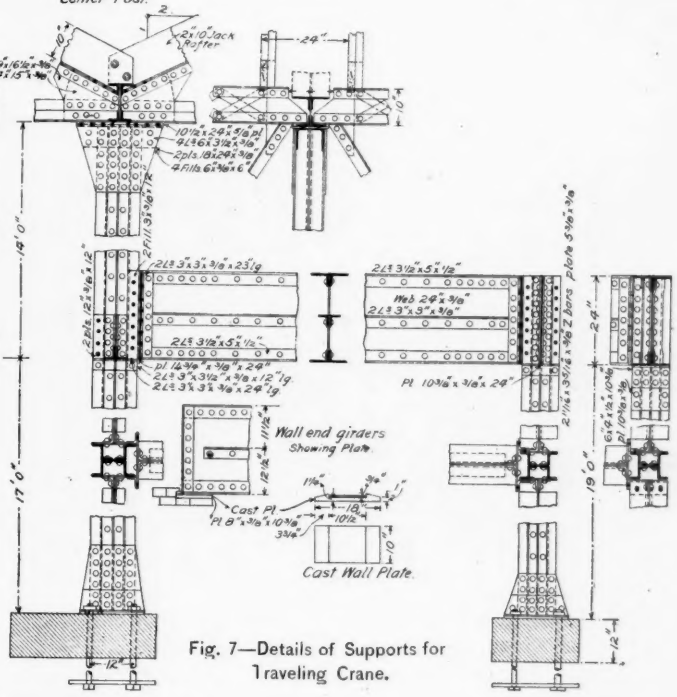



Fig. 7—Details of Supports for Traveling Crane.

of the number of working parts the liability of accidents and breakage is reduced. Another advantage is that the inspectors can at a glance see everything there is about the truck.

### IRON TANK FRAMES.

Mr. RHODES said that ten years ago on the Panhandle he had two tanks constructed with iron sills, but the road is using wooden sills under their tanks. On his line they have been investigating in a desultory sort of way the question of iron frames or wooden frames for our tanks.

Mr. PECK has had experience with iron tank frames, and agrees with Mr. Rhodes in that they are very expensive after they have run five or six years.

Mr. C. J. CLIFFORD'S experience with iron tank frames has led him to believe that a man can become converted to what he once considered a very bad thing. In 1873 iron tank frames were constructed with round corners and made of one piece of 6-in. channel iron. He had some twenty-five, and whenever any of them were in a collision they were so badly bent that it was almost impossible to straighten them. After that he had some experience on the Erie road with frames made of steel channel iron 10 in. in width and straight. There were two center and two side sills of the same size, with 1¼ × 10-in. iron plates for end sills. A piece of oak 10 × 12 in. was bolted to this plate to stiffen it in collisions. The sills were connected with diagonal braces, riveted firmly together with 1-in. rivets. In very severe collisions which stripped consolidation engines, the tenders came out intact as far as the frames were concerned. His bad opinion is entirely changed, and he now believes that where they are properly constructed they are superior to those made of wood.

Mr. LEWIS took issue with Mr. Rhodes on the statement that iron tank frames had not proved a success, as he did not believe any man who has introduced iron tank frames was willing to go back to the wooden frame. While true that in case of collision it cost more to repair an iron frame than a wooden one, still the liability of failure or serious damage is much less to the former than it is to the latter. He has 15 iron tank frames in service on his line that after seven years' service, have not as yet had one single new frame. The back ends of the frames have been bent down and damaged in other ways, but in every case they have been straightened up, and the frame restored to its original shape. Some of these frames have been in accidents which would have utterly destroyed a wooden frame. If Mr. Clifford's first frame had been a wooden frame in the same accident there would have been

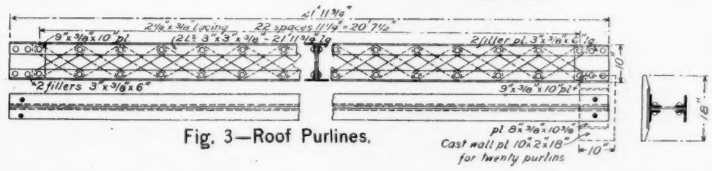



Fig. 3—Roof Purlines.

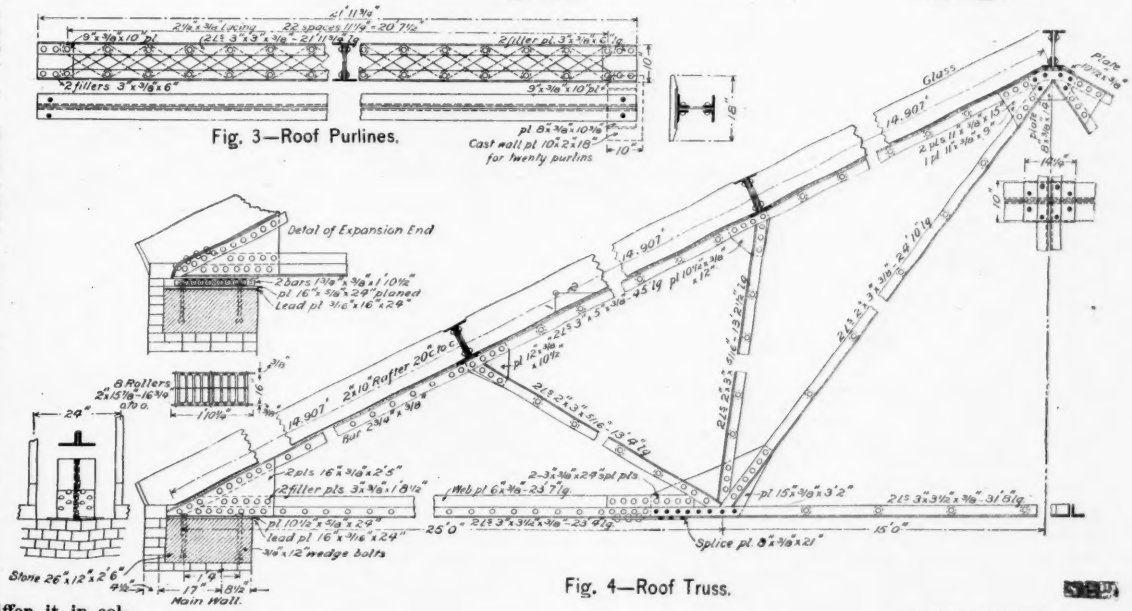



Fig. 4—Roof Truss.

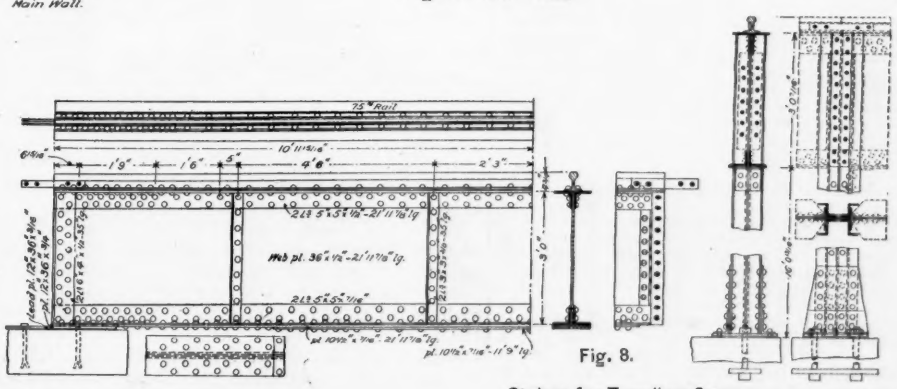



Fig. 8.

Girders for Traveling Crane.

LOCOMOTIVE REPAIR SHOPS OF THE ILLINOIS CENTRAL AT BURNSIDE, ILL.

nothing left to fix up. Under the worst conditions we have at least a salvage of the old material, while in the wooden car we have nothing.

Mr. SQUIRE noted that a large proportion of the tank frames on the American engines at the World's Fair were built of metal. This would indicate that the builders were trying to put metal frames on the market.

President FORSYTH reported that the Baldwin Locomotive Works were building about 50 per cent. of all their frames of iron, and thought that the same rule would hold good at the different locomotive works.

Secretary STREET mentioned Mr. Player's method of working his old bridge channels and I-beams into tank frames. He adopted good sized I-beams for the center sills, and for the side sills he used what he had. The sills were bound together by plates on top.

### COST OF REPAIRS.

Mr. RHODES said the subject of iron car construction was an interesting one, and that if the claims made in the paper could be sustained, that the railroads ought to give their closest and best attention to it. We have instructions now at the shop to construct a car with wooden sills, not in the way they have been done in the past, but with some of these improved methods. Now, in this paper a good deal of stress is laid on the fact that iron cars are used in the old country, and therefore they ought to be used here. Nothing is said about the price of the iron car compared with the wooden car there, and the lack of this information makes it difficult to explain why the iron car is being so generally introduced in the old country and not here. We have been trying to get the iron car here. Iron cars have been built and have not met with success. The Southern Ice Company were the bane of every road they ran over. The men cannot repair them because they are not blacksmiths. The experience of railroad people generelly is that more expensive material means more expensive maintaining.

Mr. WAITT referred to the radical change that the use of steel would make in the class of mechanics and the class of tools employed in the shops.

Mr. LEWIS said that he believed that with the introduction of steel and iron the men will become educated to it. Carmen and car builders have opposed the steel and iron car because they have not been educated in its construction. Another thing is the cost of repairs. Steel or iron sent for repairs is frequently patched by a workman at a greater expense than the new material would be. A carman feels that he is depending on the rolling mills for new steel, while, if he puts in a wooden beam, he draws on his own lumber pile and can make it himself, while the labor expended may cost more than the iron beam. In view of the progress made in other industries the car builder has not kept pace with the times. I am not ready to accept Mr. McIlwain's figures as to the cost of maintaining wooden cars as compared with steel. It is wrong to take the car as a whole in the question of repairs.

### METAL UNDERFRAMES.

President FORSYTH thought the most valuable suggestion in this paper is that in regard to the center sills; the use of steel center sills with the draft rigging attached directly to them. He says that these two items cost more for maintenance than all the rest of the car above the wheels. He thinks that with steel beams or channels for center sills the expense for maintenance will be largely reduced. He is in favor of making a commencement with the center sills of metal in car construction.

Mr. WAITT had had experience with one car built with channel iron center sills and channel draft irons. The car has been running over ten years, and everything in connection with the center sills and the draft rigging is in just as good order, barring the rust, as when first built. The shop record shows that no repairs had ever been made to that part of the car. The railroads should equip a number of cars with steel center sills, start slowly and find where the strong and weak points are.

### GENERAL CONSIDERATIONS.

Mr. GIBBS admired Mr. McIlwain's courage in coming forward with definite figures for the saving which is obtainable by the use of metal cars, but could not accept his basis for computing the relative life and repairs of metal and wooden cars. The relative tensile or transverse strengths of wood and steel, is not a proper basis of comparison. When you test a single portion or member you determine its ability to carry a dead weight. A car is a complex structure, built of many pieces fastened together, and in that fastening lies the question as to whether a metal car will be a success or not. Mr. McIlwain says that a wooden car's life is 12 years, on an average, and he gives a life of 48 years for a steel car. Mr. Gibbs does not find the data from which he draws this important conclusion, unless it be in the clause where he speaks of bridges or buildings. In those structures the strains are static; the load is applied and remains, or, if removed, the motion is gradual, while in a car we have a box-like structure subjected to all sorts of wearing and racking strains. Now wood comes pretty near being the ideal material to resist such strains. Iron or steel seems very far from ideal, and yet he would not say that a combination of the two might not be an improvement in car construction. He thinks in a composite structure will be found the secret of success in the use of iron or steel for cars. Mr. McIlwain says a metal freight car will cost 50 per cent. less than a wooden for maintenance; and further on, in speaking of passenger cars, he states that the reduction of repairs will be 250 per cent. for the metal car. Mr. Gibbs would like him to explain the cause of this difference in the two classes of cars. Mr. McIlwain makes, however, a very good suggestion elsewhere in his paper, and that is in the use of steel draft sills in connection, possibly, with wooden side and intermediate sills. The speaker would emphasize the point that lack of tensile strength of the material does not always shorten the life of a structure or make it a failure. Under his tenders he has a very light diamond center truck with wooden frame, and the parts appear to be too light for tender work; they bend and spring, but remain in line and hold together remarkably well.

President FORSYTH thought that the Lamont car and the Harvey cars, which include iron or steel construction as a covering for the main frame were not economical or successful. There are parts of a car where it is not necessary to put in a strong material, and the frame of a box or stock car where iron or steel is not necessary, and it is useless to go to an extra expense to put it there. The same is true of iron roofing or siding, where the material is subject to corrosion. In passsenger cars it may be successfully introduced because it is thoroughly protected by the paint and varnish.

Mr. ENGLISH reported having a small number of Harvey steel cars, and was satisfied that they are a desirable construction for cars. He believes that steel will supplant wood. Steel will stand a greater shock, and the time is rapidiy approaching when we will be compelled to substitute steel or iron for wood. His cars have cost nothing for repairs outside of drawheads during a year's service.

Mr. MCILWAIN said he based the life of steel cars on the relative strength of wood and iron. There was nothing else to base it on. He takes the life of steel in other structures, bridges, steamships, etc. We have metal bridges 25 years old and apparently they are as good to day as when they were put up. Twelve years is the average life of a wooden car. He has based his figures on the comparative strength given in technical books for steel, iron and wood. The figures given are, of course, visionary. They are based on a general experience of about 30 years, and the experience of a great many others. From the fact that we have not had the necessary experience, we are compelled to figure on what we know about steel in bridges, buildings, ships, etc. The upper frame of a stock car goes a great deal quicker than the lower frame, and therefore the posts and braces of a stock car should be of metal. There will be nothing saved in a wreck. They are bent up if metal and broken up if wood, and we can get the salvage if we cannot straighten them. No master car builder, when he takes a second thought, would want to build a wooden upper frame on top of a steel underframe of a passenger car and have that car go into a collision, with the possibility of the car next to it going up over it.

Mr. WAITT had been strongly impressed with the necessity of great strength in the body frame of the car, which has to take the severe shocks in wrecks; also the necessity of some stronger framing for the ends of the cars, but that the necessity for a very much stronger framing than the average in use for the sides of the cars he has not realized. He believes that it is unwise to make the roof construction heavy. The roof should be strong enough so as not to tremble or jar, but it is unwise to make the superstructure of the car so heavy that when the car stops the inertia of the top is going to have a great tendency to drive forward. In the summer, in a large freight yard, when the sun has been beating down for a number of hours, the air is oppressive, the reason being that a large amount of iron in the yard has absorbed the heat. He would not use iron at all on stock cars. If iron is covered with clear water it will not be affected much, but if it is alternately wet and dry it will corrode, and from the ammonia which is present in the stock cars at the bottom of the post, the corrosion would be very rapid. Oak will stand that much better than steel or iron.

Mr. DELANO thought it the sense of the meeting that in certain parts of cars, steel would be used more than it had been. He believes that for certain purposes wood is better adapted than iron and steel, and the question of which is to be used will depend on the relative cost.

## The Wengern-Alp Rack Railroad, Switzerland.

BY T. DELMAR, PH.D., C. E.

In the Wengern-Alp Railroad, opened to traffic last summer, many of the improvements which the experience of many years on different rack roads has developed and especially that on the Rigi Railroad, have been incorporated. It may therefore be considered as a good standard for future construction of roadbed and track at least, if not for motive power.

The use of steam locomotives makes the operation of some mountain roads so expensive that they frequently do not pay expenses. The operating expenses are enormous and one-third of them is for coal consumption. The cost of transportation to the starting point of the mountain railroads makes the price of coal two or three times what it is at the mines. For instance, on the Generose Railroad the gross earnings per mile are $1.45 against $1.30 operating expenses and on the Rothhorn Railroad $3.40 against $2.50. The coal consumption of the last-named road is 116 lbs. per mile one way, and as little coal is burned during the descent, a consumption of 209 lbs. per mile may be taken as a fair average for a grade of 22.12 per cent. with a train load of 54,000 lbs. It is believed that operating expenses may be lessened by adopting electrical power. The conditions for the use of electricity in these mountain districts are favorable as great water power can be utilized in the immediate neighborhood. The use of electricity was considered during the construction of the Wengern-Alp Railroad, but the project was abandoned because the contractor for the electric plant would not give the guaranty required. However, the Wengern-Alp Railroad is thought by many to be the last mountain railroad that will be constructed in Switzerland to use steam as a motive power. Another advantage of electric power is that no standpipes are necessary. At these great heights it is often difficult to procure enough water. Taking water occasions great delay, as stops of 5 to 10 minutes are necessary every 1,000 ft. vertical lift and at places where no passengers or freight are received.

A further advantage in using electric motors is that the passage of the tunnels would not be rendered so disagreeable from smoke. Now tunnels are avoided on account of the heat, sparks, smoke and odor of oil. In these long and sharply-curved tunnels, with their steep grades, they are almost intolerable. To better these conditions the height of the tunnels has been increased from 12 to 16 ft., though the height of rolling stock is but 10 ft.; but the increased height does not help much.

Fig. 1—Wengern-Alp Rack Railroad.

The conditions of construction for rack railroads are very different from those of ordinary railroads. One difficulty is the transportation of materials used in the structure. Inexperienced contractors lose much by underestimating the cost of such work. All materials have to be transported by men or mules, and the relative cost of a vertical lift of 100 lbs. to 100 ft. is by men 1.3 cents; by mules, 0.7 cents, where wages are five to eight cents an hour. The hauling of one cubic yard of sand from the valley to the top on the Wengern-Alp Railroad would have cost $12, which fully illustrates the importance of the transportation question. In addition to the cost there is much which cannot be transported by reason of its weight or length; for instance, no timber longer than 20 ft. can be carried, which makes the construction of falseworks very difficult. Material must be carried often through places where a man who is not accustomed to the mountains could hardly pass. In long rock cuttings it is frequently necessary to make a footpath and begin blasting from both ends before work on the whole length can be started. Still another difficulty is the boarding and lodging of 1,000 men at these heights, the food and barracks having to be brought up in packages and pieces from the valley.

Cuttings were generally begun on the lower end, and the material carried down into the embankment below a small part of the upper end went to the embankment beyond and the remainder was wasted on the side. To retain the dirt dumped at the side great retaining walls, such as are shown in fig. 3, were often necessary to prevent the material from rolling down to inhabited parts of the valley below.

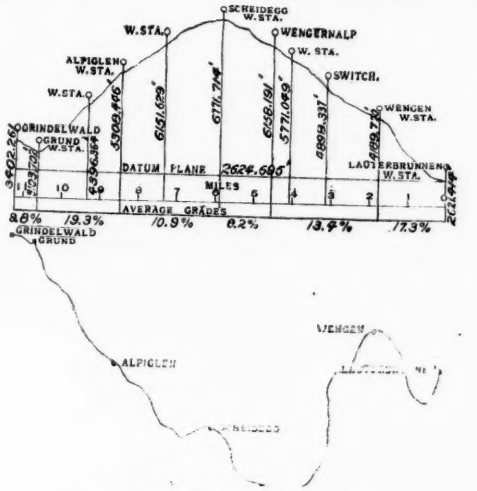



Fig. 2—Plan and Profile.

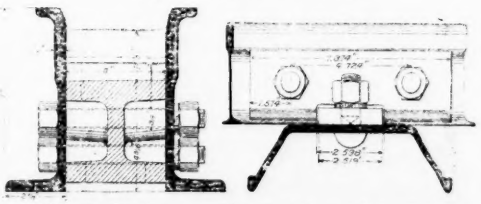


Fig. 7—Section. Fig. 8—Intermediate Support.

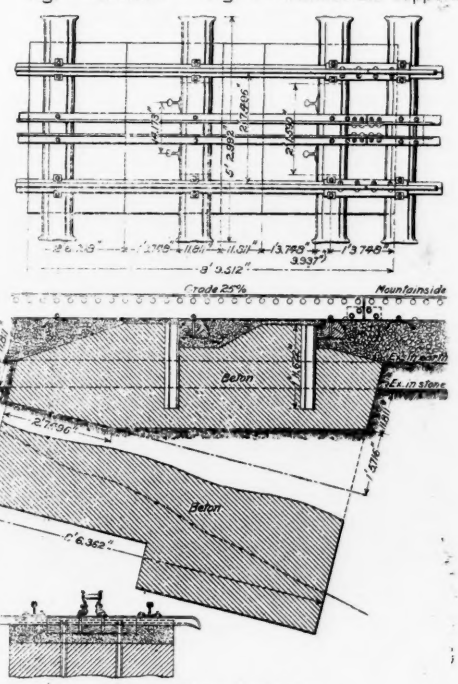



Fig. 9—Track Anchorage.

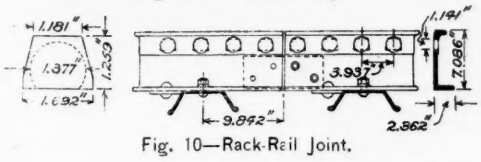


Fig. 10—Rack-Rail Joint.

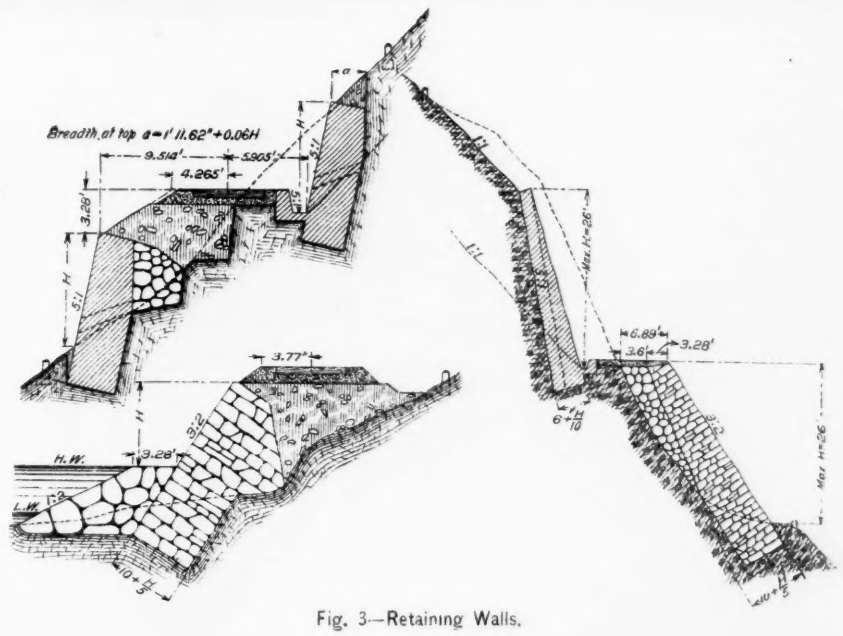



Fig. 3—Retaining Walls.

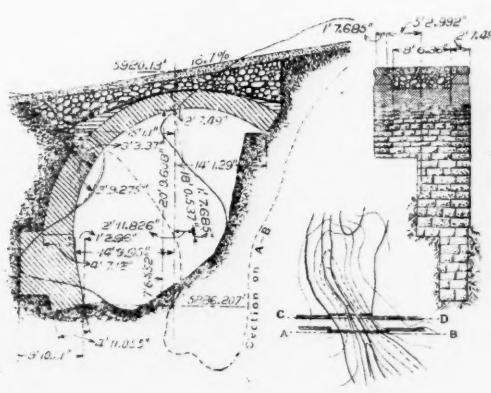



Fig. 4. Fig. 5.

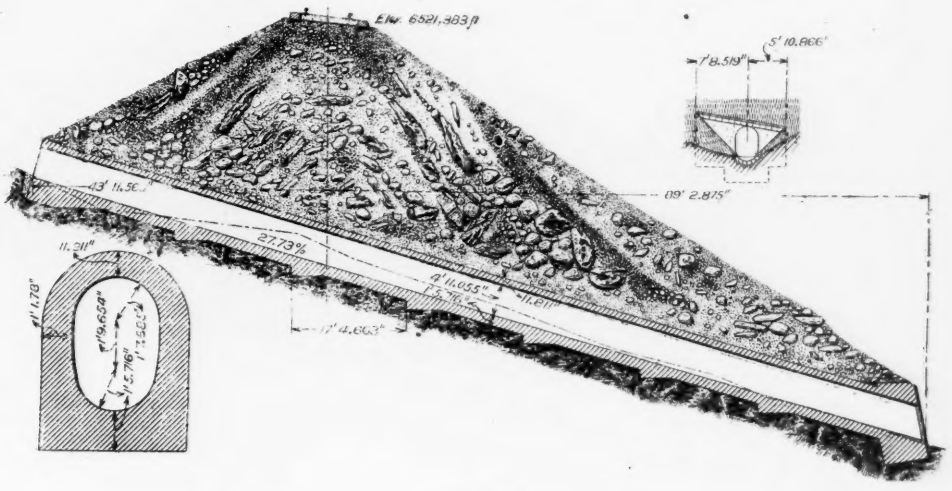



Fig 6.

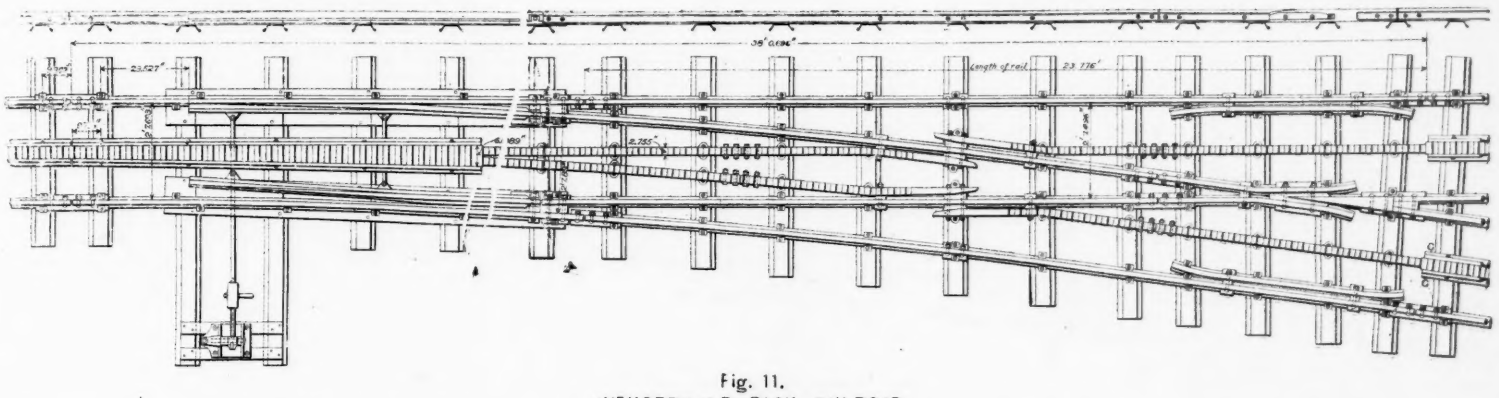


Fig. 11.

WENGERN-ALP RACK RAILROAD.

The estimate for the construction of the Wengern-Alp Railroad, a length of 11.1 miles, was as follows:

| | Sum. | P. c. of the total. |
|---|---|---|
| Engineering and superintendence | $52,089 | 6.5 |
| Right of way | 60,000 | 7.5 |
| Substructure | 300,000 | 27.5 |
| Permanent way | 260,410 | 32.5 |
| Buildings | 42,200 | 5.2 |
| Eight locomotives | 67,200 | 8.4 |
| Eight passenger coaches | 13,368 | 1.6 |
| Two freight cars | 1,400 | 0.2 |
| Sundries | 3,342 | 0.6 |
| | $800,000 | 100.0 |

or a total cost of $72,072 per mile.

Fig. 2 gives a general plan of the road; the total length is 11.1 miles; the total rise or fall of the whole road is 8,115 ft.; the maximum grade is 25 per cent.; average 14 per cent. minimum (except at stations), 3 per cent. The cars are always run above the locomotive, and are not attached to it on account of danger to passengers in case of an accident to the locomotive. On the 3 per cent. grade cars will not follow by their own gravity, so it becomes necessary to couple them on this stretch of track, which is accomplished by a simple hook coupling, which after leaving the grade, is uncoupled again by the conductor. The transition between two different grades is made by vertical circles of 1,312 ft. radius. Trains are run at from 3.9 to 4.8 miles an hour according to the grades, but at the same rate up and down; this low speed is thought necessary for safe operation.

The Wengern Alp Railroad is of same gage as the other Swiss mountain railroads (2 ft. 7½ in.), which accommodates itself to the broken topography of the country; but it is rather too narrow for a simple and easily-accessible construction of the locomotive, and the stability of the rolling stock. It is at least questionable if the little extra expense necessary for a gage of 3 ft. 3⅜

DATA OF RACK RAILROADS IN SWITZERLAND.

| | Vitznau-Rigi. | Goldau-Rigi. | Schyinge Platte. | Wengern Alp. | Pilatus. | Gencross. | Rothhorn. | Glion-Naye. |
|---|---|---|---|---|---|---|---|---|
| Capital, dollars | 630,600 | 1,192,000 | 700,000 | 900,000 | 570,000 | 410,000 | 464,000 | 500,000 |
| Cost of construc. per mile, dollars. | 131,500 | 131,300 | 126,100 | 71,460 | 169,200 | 68,300 | 76,200 | 86,800 |
| Gross earning per mile, dollars... | 5.30 | 1.70 | .... .... ..... | ..... .... | 5.60 | 1.45 | 3.40 | 3.10 |
| Operat. expen. per mile, dollars.. | 2 50 | 1.40 | .... .... ..... | ..... .... | 3 10 | 1.30 | 2.50 | 1.10 |
| Minimum radius, feet | 394 | 394 | 197 | 197 | 262 | 197 | 197 | 262 |
| Tractive power, pounds | 15,000 | 13.800 | 14,300 | 14.300 | 12,300 | 12,100 | 14,300 | 14.300 |
| Locomo. weight in service, tons.. | 15.8 | 17.5 | 16.5 | 16.5 | 9.2 | 14.5 | 16.6 | 16.0 |
| Gross weight of train, tons..... | 25.5 | 30.0 | 25.2 | 25 2 | 11.5 | 23.8 | 24.4 | 24.4 |
| Fuel consump. per mile, pounds. | 109 | 72 | 98 | 56 | 112 | 63 | 116 | 74 |
| Allowed speed per hour, miles... | 4.3-5.6 | 4.3-5.6 | 4.3-5.6 | 4 3-5.6 | 4.3-5.6 | 2.2 | 4.3-5.6 | 4.3-5.6 |
| Brakes | Air, crank, axle, trailing-axle, automatic steam brake | Air, crank, axle, trailing-axle, automatic steam brake | Air, 2-driving-wheel, automatic steam brakes | Air, 2 driving-wheel, automatic steam brakes 16 2d cl., 32 3d cl. | Air, crank, axle, trailing-axle, automatic steam brake | Air, 2-driving-wheel brakes | Air, 2-driving-wheel, automatic steam brakes | Air, 2 driving-wheel, automatic steam brakes |
| Seat number, summer cars | 60 | 60 | 48 | 236 | 32 | 56 | 48 | 56 |
| Dead weight per seat, pounds.... | 183 | 183 | 234 | 75 | 75 | 188 | 211 | 192 |
| Fare up, down, both ways (dollars) | 1.40, 0 70, 2.10 | 1.60, 0.80, 2.20 | 1.60, 0.80, 2.00 | Both ways, 2d class, 3d class, 2.90, 1.80 | 2.00, 1.20, 3.20 | 1.50, 1.00, 2.00 | 2.00, 1.20, 3.20 | 1.50, 0.95, 2.20 |

in. (metre) should not have been adopted. Of the total length of the road 34.5 per cent. is curve, and of this 43 per cent. has the smallest radius, 197 ft., a 29½ deg curve, and the others are respectively 22, 17½ and 8¾ deg. curves. The greatest length of tangent is 1,800 ft., and of uniform grade 3,500 ft., an unusual length in a rack railroad. The total substructure consisted of 261,000 cu. yds. earthwork, 52,000 cu. yds. rock cutting, 13,000 cu. yds dry masonry, 6,500 cu. yds. masonry, 2,600 cu. yds. bridge and culverts masonry.

In so rough a country engineering structures are numerous. Between Lauterbrunnen and Scheidegg, a distance of 5.8 miles, there are 8 masonry viaducts with 24 spans of from 12 to 52½ ft., and a great number of smaller culverts and bridges, seven of which have been necessary to avoid the level crossing of the horsepath and the danger to animals crossing it. All bridges are stone or concrete-arches, except three, where they were impracticable. Masonry arches were employed because in many places iron bridges would have been damaged or carried away by avalanches, and the transportation and erection of them would have been very difficult and expensive. As the time allowed for construction was short (and only six months of a year could be used for work) it was necessary to avoid the stoppage of track-laying at every bridge.

Fig. 1 shows some stone arches and a general view of the country. A special feature is the 1:20 batter on the lower side of the piers. The breadth of all bridges, including parapets, is 13 ft. 9 in., and they are provided with railings on both sides as required by the Swiss Railroad Commissioners. Fig. 4 shows an extraordinary arch form which the irregular topography rendered necessary. The culverts are of concrete, figs. 4 and 6, or entirely of cut stone masonry, or with broad dry masonry abutments and mortar masonry arches. The walls are laid dry to save lime and sand, which costs at these great heights, where all has to be hauled by men or mules, in some places as much as $10 for masonry and $23 for concrete per cu. yd. On the whole line there is but one tunnel, of 80 ft., which is in a very fortunate location.

The dimensions of the roadbed are given in fig. 3; on steep slopes the embankments have been secured by steps, each 3 ft. rise. In consequence of the steep grade it was necessary to pave the ditches, the water being taken through the roadbed by iron or cement (12 in.) pipes 300 ft. in length, fig. 6. The substructure of the road is drained by small ditches oblique to the line of the track. The roadbed consists of a layer of stone, 6 in. deep, covered with 6 to 12 in. broken stone ballast, 6 in. embankments and 12 in. cutting, fig. 9. The ballast is walled on both sides with dry masonry banquettes to prevent displacement of the track, especially on the outer side of curves, figs. 3 and 6. This construction gives a very solid and secure impression, but it is doubtful if the advantages offset the expense.

The track, with the exception of the switches, is very similar to that of the Rigi Railroad, which itself contains all the improvements suggested by an operating experience of 20 years. Wooden ties have not been used and bending of the rails is avoided by using larger cross sections and bolts instead of spikes. On the Rigi Railroad the rails cut into the ties, which made the rails lower than they ought to be, requiring the cogwheel to carry part of the load and making the cars ride roughly. The Wengern-Alp rails are 3.94 in. high, 3.6 in. base; web, 0.31 in.; weight, 41 lbs. a yard; moment of inertia, 8 64; moment of resistance, 4.39, and the maximum wheel-load is 7,700 lbs. The splice connections are angle fishplates. Attention is called to the intermediate fishplates, fig. 8, which are fastened at the rackrail joints to the rails and ties, so as to prevent a sliding downward of the track. This motion of the track requires the greatest attention during construction. Wedges are driven in between rails at the joints and allowed to remain till the track is adjusted and solid supports provided. The method employed is shown n in fig. 9, and these fixed points are built at distances of 200 to 500 ft., according to the grades.

In all new mountain railroads the rails and rack-rails are as long as possible, as work and material are saved by avoiding joints. The old Rigi rails, for instance, were double, and the Wengern-Alp rails are thrice the length of the rack-rail. The length of the rail was 34.4 ft., which is probably the limit, as it is too heavy to carry ahead on the steep grades, weighing 480 lbs. The track bolts have very little play on the Wengern-Alp Railroad, which requires that all joints be precisely opposite one another. To attain that, different rail lengths were made; one normal for tangents, one for the inner and one for the outer rail for curves with radii of 197, 262, 328, 656 ft., and one pair of compensating rails, which were ½ in. longer and shorter, respectively, than the normal rail, 34.4 ft. By combining the different lengths it was possible to have the joints directly opposite in all cases.

One fact had not been considered, the rail lengths had only been figured in ratio to the radii of curves which were located as horizontal curves (as on level ground) without regard to the grades, and this caused some trouble in the tracklaying. To illustrate the influence of grades to rail lengths in curves, take a long curve with 197 ft. radius. For an axial length of 10,494 millimeters we would have 10,420 for the inner and 10,568 millimeters for the outer rail. The difference between the two rail lengths with a consideration of the curve only is 148 millimeters 6 in., but if this curve is on a center line grade of 25 per cent., the grade for the inner rail will be 25.18 per cent. and for the outer 24.82 per cent, and the result of this difference in inclination is, that the inner rail will be 2 in. behind the outer rail for 328 ft. length of curve.

*The rackrail, fig. 7, of the Wengern Alp is a decided improvement over others. It is of soft open hearth steel. The construction can be seen from figs. 7 and 10. The space between the two channels is 4 in., while the breadth of the cogwheel is only 2.36 in. The cross-section of built rack rail is funnel shaped, widening upward, to prevent the friction of the cogwheel on the sides. On curves the obliquity of the cogwheel teeth amounts to 0.031 in. as a maximum, in consequence of the fixed axles of the cogwheels. The maximum tractive force of the two locomotive driving-wheels is 15,000 lbs. Tests made in the Federal testing laboratory at Zurich showed a breakage of the teeth under a load of 86,700 to 95,700 lbs. The material of the teeth had a strength of 55,458 lbs. per sq. in., and 30 per cent. elongation; the channel material, 61,146 lbs. per sq. in. and 25 per cent. elongation. The drop test gave a breakage of the tooth at the fourth shock where the fall had been gradually increased to 8.2 ft. height with a 13,200-lb. weight. The rackrails being of soft open hearth steel iron, they can be riveted easier and the holes fill better. The material is more homogeneous than the hard iron, but is quicker worn out in service. Hard open hearth steel iron makes working the more difficult and does not offer so good resistance against blows. Often the bolt-heads burst off during the riveting, or the web becomes brittle when making holes and breaks between the rivet holes. The machine factory at Bern tried rivetings with channels of different thickness, and found that webs over ½ in. thick become too hard by punching the hole, and it was necessary to anneal them, besides the holes receive a batter and in consequence are not entirely filled out by the rivets. According to these tests an extraordinary thickness of the web would not give any more guaranty against the teeth becoming loose than a thinner one. Experience has proved that the loosening of the teeth need not be feared if the workmanship is carefully executed. The rack-rail of the Wengern-Alp Railroad is economical, as it is very simple to make. The price of it, including fastenings, was $3.20 a linear yard; the complete track cost $5.50 a yard, and its weight is 284 lbs. a yard. The time for laying the track was 1,600 working hours per mile; an average of 650 ft. a day.

The Wengern-Alp Railroad has an advantage over old constructions in that the locomotives have two cogwheels which are coupled a distance apart equal to on half-tooth distance less than the teeth of the rack, so that the tooth-catching is continuous. All cars and locomotives are fitted with two cogwheels, and the result is a very smooth-riding car, quite free of shocks. These two coupled cogwheels also allowed a new switch construction, in which all is fixed except the tongues. At the crossing of the rail and rack-rail the latter is omitted for a length of 4 ft. 3 in., the distance of the two coupled cogwheel axles being 4 ft. 5 in. One cogwheel propels the train and the other makes its revolutions in the air until it has crossed the wheel rail and arrives at the continuation of the rack-rail. The switch construction is shown in fig. 11, and needs no explanation. The switch rack-rail is made from Martin cast steel after tests made in the royal testing laboratory at Berlin. It broke as a result of blows amounting to 176,070 foot-lbs. energy, and was supported from points 2 ft. distant.

In concluding this description a brief mention of some of the difficulties attending the surveying and location of the line may not be amiss. The preliminary surveys were polygonal lines, and profiles were taken perpendicular to the lines; the length of these cross-profiles varied with the inclination of the ground, an average distance of 300 ft. both sides. From the preliminary surveys a plan with contour lines was drawn and the line projected on it. This line proved almost useless, as on such ground the curves could not be located with enough detail, owing to the cost. Further, the plan gave a very inaccurate idea, and in consequence the line often avoided the crossing of a small earth hump by curves; and, on the other hand, it frequently happened that the chosen direction would necessitate immense earthwork.

The surveys were undertaken in the face of great difficulties and dangers; the sides of the mountain were steep and barren. The surface was frequently of loose stones, rendering it necessary to have all men engaged in the surveying work anchored with ropes held by men with a firm footing. Frequently the places where surveying operations were conducted could not be reached without ropes and ladders. Exact measurements were very difficult under these conditions, and on rack railroads exact measurements are of the utmost importance. On a 25 per cent. grade an error of 12 in. in length would cause a difference of 3 in. in the height.

The following table gives some interesting statistics of the rack railroads of Switzerland, and is a supplement to the table given on page 892 *Railroad Gazette*, 1893.

* From a paper published by Mr. E. Stoub, Inspector.

## Air-Brakes and Their Maintenance.*

The year 1893 has been a memorable one for those manufacturing and using air-brakes. The compulsory laws and increased demand for safety appliances have turned the attention of manufacturers to this industry. The decision of the Courts on matters pertaining to the quick-action brake cannot but be for the best interests of all concerned. The work done by the railroads and clubs has been important. The M. C. B. Association has appointed a committee to report at the next annual convention on "What is being done and what should be done to improve the maintenance of brakes on both freight and passenger equipment." The M. C. B. committee on "Air-brake tests" has also been at work. It will be of interest to know that in November last the committee inaugurated in the Brake Test Building at Altoona the first of a series of tests. The data gathered will appear in the technical papers early next month. The method of weighing up the value of triples will mark an important step in the history of such investigations owing to the fact that eight forms of triples of 50 each were submitted to the committee for investigation.

We have specifications for wheels, axles, iron, steel, boiler plate, but in the matter of brakes the manufacturer has nothing for his guidance. Triples of different construction have been put in service in the past and will be in the future. If a satisfactory specification can be framed and tested in the shop much of the present uncertainty as to their action in service will cease. Another feature of this question is that of better prices. The expert work on brakes has been left with the brake manufacturer. This care and expense cannot continue. The large increase in air-brakes makes it essential that railroads interest and inform themselves on this subject.

I shall invite your attention to some of the defects of brakes, and to some remedies for their better maintenance. One defect that has given considerable concern is the amount of dirt that works its way through the pipes to the triple. Here are samples showing thirty-six of the thimble triple screens recently obtained from two of our repair shops. They are mostly filled solid with rust, cinder, scale and oil. Some have pieces of coal, another a sliver of wood, another a piece of iron 2 in. × 1½ in. and ⅛ in. thick, still another has a part of a hose gasket squeezed into it. Two have dirt filling a portion of the pipe. Two extensions have been applied to the screens to hold the dirt in place. Among the samples were some from other lines, viz., Pennsylvania Railroad, Delaware, Lackawanna & Western, and the Merchants' Despatch Transportation Company.

Perhaps the worst case that our attention was called to was that of Exhibit No. 2, which was taken from a Burlington & Missouri box car. The screen is in good order, but solid with dirt and rust. The handful of black, rusty-looking material is not coal or gravel, but an agricultural product. It is corn, and was found in the branch pipe immediately outside of the screen.

Exhibit 3 is a short bottle filled with rust and scale which was jarred off the inside of 8 ft. of pipe removed from a refrigerator car. Piping on refrigerator cars is very susceptible to rust and should receive attention. Exhibit 4 shows short samples of this pipe. It is 1 in. in

* Abstract of a paper read at the January meeting of the Western Railway Club by G. W. Rhodes.

diameter, and in some places is almost rusted through.

Exhibit 5 is a bottle filled with scale taken from 16 ft. of new 1¼ in. pipe after it had been bent and hammered and was ready to apply to the car. All new pipe after being bent should be carefully tapped with an old bolt or hammer, and afterward tipped on end so that all loose scale may be removed. Before the triple valve connection is made the pipes should be blown out with air pressure. This detail in new car-construction is very apt to be overlooked by builders. These five exhibits point out strongly: 1st. It is very essential to have screens both at the triples and in the main train pipe. 2d. Having applied the screens it is equally essential that they should be properly maintained, and that the dirt they have collected be removed.

Those who have designed brakes have made provision to readily remove any water which may collect in the pipes, but it is doubtful if the presence of such quantities of rust and dirt was expected. That it was expected the pipes would collect some dirt is clear from the presence of the screens and from the provision of a dummy coupling for the uncoupled hose. One very good suggestion is that the branch pipe from the main train pipe should connect with the top of the drain cup in place of the bottom. The branch pipe takes off directly from the bottom. If the screen is imperfect or worn out, this allows any dirt lodging in the bottom of the cup to drop into the branch pipe. A connection from the top or top side of the cup would remedy this.

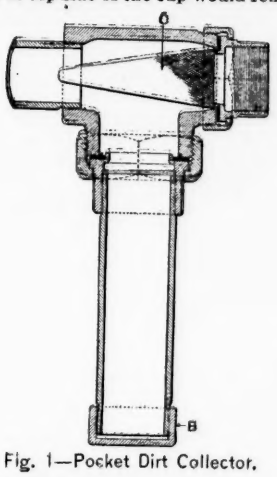



Fig. 1—Pocket Dirt Collector.

A practical attachment is shown in fig. 1. It is constructed of ordinary gas pipe fittings, and is placed immediately under the main train pipe screen or the triple valve screen. The pocket has a cap, *B*, screwed on the bottom. This pocket is screwed immediately under the screen *C* to collect the dirt. The shape of the screen is changed and as grit and dirt grate against the screen it drops into the pocket away from the air passages. When the pocket is removed to be cleaned, the screen can be thoroughly inspected without disturbing the pipe connections.

Three of these devices have been in use experimentally over a gravel-ballasted roadbed, and during the dry summer months collected a lot of dirt which, from time to time, was removed. Exhibit 8 shows three small bottles of dirt collected during a short test. The first two bottles contain the dirt collected in thirty-five days, and the third in fifty-two days. The third bottle, contains three times as much dirt as the other two. It was on the last car and the hose was hung in the dummy coupling at all times. The contents is a fine, light-colored sand or gravel; there is some dried grass also. The contents of the first and second bottles is entirely different. They indicate a fine, black powder, doubtless also sand, but more mixed with the scale of the pipe and less in total quantity. The outside dirt comes in chiefly through the last hose when the cars are switched, and the last triple gets the bulk of it.

To some this test shows clearly how imperfect a device the dummy coupling is. The best solution of this question is to automatically close the couplings by hand against dirt when they are uncoupled; for some more convenient way of removing the dirt that collects in the pipes is imperative.

Many of the triples, even with this dirt, will work in a fairly satisfactory way, just as the old automatic air brake did when the train pipe drain-cup was packed with sponge through which to filter the air. To probe this question further, the following auxiliary reservoir charge tests were made: First, we got some sand, fine coal and iron rust (Exhibit 9), and having pounded it well together filled a triple screen as full as we could get it, and connected up the pipe. On charging the reservoir, we found that the time occupied only exceeded that with a perfectly clear screen by nine seconds. We next soaked the mixture throughly with water, then with black oil, and finally put in a new screen. The result of the different tests is as follows:

All tests were made with a constant pressure of 95 lbs. in the train pipe, and the time was recorded in seconds from commencement of the charging at a zero point in the reservoir till 70 lbs. was reached.

| Test No. | Condition of triple screen. | Time in seconds charging reservoir to 70 lbs. |
|---|---|---|
| 1 | Dry sand, pounded iron, rust and coal.. | 77 seconds. |
| 2 | Ditto, except that the mixture was soaked in water before the screen was filled..... | 98 seconds. |
| 3 | Ditto, except that the mixture was soaked in black oil before the screen was filled..... | 112 seconds. |
| 4 | A new and clean screen was used in this test..... | 68 seconds. |

The same triple, which was a new one from the storehouse, was used in each of the above tests. After test No. 4 the triple valve was opened and examined. One teaspoonful of dirt was found in the drain cup, and a little fine sand and rust about the triple valve.

There is nothing mysterious about the above test the charging of the reservoir is through a feed opening in the triple which is hardly $\frac{1}{16}$ in. in diameter. The screen may almost be choked full and yet have an opening equivalent to that of the feed groove.

Exhibit 10 is the lower portion of three New York No. 1 triples, which were probably put in service without screens in the train pipe drain cup. They, however, had triple screens which have not been disturbed; it will be observed that they are practically plugged full of dirt, at any rate they were full when first removed from the car. These were subjected to the test just described, with the following result:

| Test No. | Triple. | Time charging reservoir to 70 lbs |
|---|---|---|
| 5 | 1 | 4 minutes, 25 seconds. |
| 6 | 2 | 3 minutes, 55 seconds. |
| 7 | 3 | 3 minutes, 22 seconds. |

A further interesting feature of tests 5, 6 and 7 is that in each case the brake was readily set and released in service feature, notwithstanding the presence of the dirt; no emergency feature, however, developed. It is hoped that no one will argue that because reservoirs have been charged under such unfavorable circumstances, therefore the systematic cleaning and caring for triples are not important.

The following example is to the point: A Westinghouse quick action triple was taken off a refrigerator car on account of being out of order, the screen was all right, though somewhat coated with rust. Without taking the triple apart, it was subjected to a charging test with the following result, the test being made under the conditions already described:

Charged from 0 to 20 lbs. in 5 minutes.
" 0 to 38 " 10 "
" 0 to 52 " 15 "
" 0 to 66 " 20 "
" 0 to 70 " 23 "

The triple valve was then taken apart, and it was found badly gummed up and corroded, the feed groove being almost closed with dirt. The packing ring was wiped off and the feed groove opened up by pushing the point of a pencil through it, the whole job occupying five minutes. The valve was put together again and another test made, the reservoir being charged to 70 lbs. in 65 seconds.

In discussing the results of charging the auxiliary reservoirs through screens filled with dirt, it was suggested that air could be forced through wood. To determine this point some pieces of well-seasoned pine, white oak and red oak were procured, and being turned to a given diameter, were sawed into discs, across the grain, of a uniform thickness of ¼ in. These discs were placed in the train pipe connection to the triple valve between two gaskets resting against the faced bearings. To check the accuracy of the joints, tests were first made with pine discs cut with the grain of the wood. No air could be forced by the disc into the reservoir, showing that the joint was a perfect one. The results were as shown in the following table:

| Test No. | Kind of wood. | Disc No. | Pressure in aux. reservoir. | Time. |
|---|---|---|---|---|
| 1 | Red oak | 1 | 8 lbs | 1 min. |
| | | | 18 " | 2 " |
| | | | 28 " | 3 " |
| | | | 38 " | 4 " |
| | | | 45 " | 5 " |
| | | | 49 " | 6 " |
| | | | 52 " | 7 " |
| | | | 53 " | 8 " |
| | | | 54 " | 9 " |
| | | | 55 " | 10 " |
| 2 | Pine | 1 | 29 lbs. | 1 min. |
| | | | 49 " | 2 " |
| | | | 64 " | 3 " |
| | | | 70 " | 3 " 38 sec. |
| 3 | Red oak | 2 | 23 lbs. | 1 min. |
| | | | 48 " | 2 " |
| | | | 68 " | 3 " |
| | | | 70 " | 3 " 10 sec. |
| 4 | White oak | 1 | 0 lbs. | 1 min. |
| | | | 0 " | 2 " |
| | | | 2 " | 3 " |
| | | | 10 " | 4 " |
| | | | 12 " | 5 " |
| 5 | White oak | 2 | 0 lbs. | 1 min. |
| | | | 0 " | 2 " |
| | | | 3 " | 3 " |
| | | | 8 " | 4 " |
| | | | 12 " | 5 " |
| 6 | White oak | 3 | 0 lbs. | 1 min. |
| | | | 2 " | 2 " |
| | | | 7 " | 3 " |
| | | | 11 " | 4 " |
| | | | 14 " | 5 " |
| 7 | Pine | 2 | 34 lbs. | 1 min. |
| | | | 60 " | 2 " |
| | | | 70 " | 2 " 40 sec. |
| 8 | Pine | 3 | 28 lbs. | 1 min. |
| | | | 53 " | 2 " |
| | | | 68 " | 3 " |
| | | | 70 " | 3 " 12 sec. |
| 9 | Red oak | 1 | 11 lbs. | 1 min. |
| | | | 19 " | 2 " |
| | | | 24 " | 3 " |
| | | | 29 " | 4 " |
| | | | 32 " | 5 " |

NOTE.—An examination of the disc revealed the fact that the air was heavily charged with moisture. Before any further tests were made all water was thoroughly drained from the air reservoirs. The disc, five days after the test, still showed the moisture driven into it. Pressure in train pipe, 95 lbs.

In each of the pine and red oak trials the brakes could be set and released in service, notwithstanding the presence of the wooden block, but the emergency valve would not work. In the white oak tests the brake would not work at all. The triple used was the Westinghouse quick action.

Dirty triples will, of course, largely detract from the brake's use in stopping trains. Neglect to keep it clean may entail other expenses on a railroad; such as flat wheels when the piston is so rusted and clogged up with dirt that it sticks. On taking the triple apart and pressing down on valve 5 it stuck and did not come back to its normal position. On attempting to release the brakes the train pipe air will consequently pass into the cylinder and slide the wheels. The same fault is liable to occur with any of the present modern triples that are neglected. Last month our attention was called to a somewhat similar case, where three air-brake cars were cut out of a train on account of slide flat wheels. The pistons were so gummed up that after application they would not work back. All the cars had screens in the train pipe drain cup and at the entrance to the triple.

Another feature which requires a good deal of attention is the rubber seat of the emergeney valve in the quick action triple. Exhibit 14 comprises 40 of these seats that have been removed from triples lately overhauled at our shops. A leak past the emergency valve lets the train pipe air into the cylinder and to the atmosphere through the leakage groove and pressure retaining valve. The fault is usually discovered by air blowing through the pressure retaining valve. It will be observed that most of the seats are soft and pulpy. This is especially noticeable when they are first removed, and is caused by the oil from the cylinders getting to them. Just how long these emergency valve seats will remain in working order cannot be told. To determine this a number of new valve seats have been placed in some suburban cars, a certain portion of them taken out every two months until we arrive at their failing point.

| Suburban coach. | Length of time in service. | | Condition. |
|---|---|---|---|
| | Months. | Days. | |
| 33 | .. | 14 | Very good. |
| 226 | 4 | 15 | Very good. |
| 691 | 5 | 15 | Getting bad. |
| 213 | 6 | 10 | Very good. |
| 205 | 7 | .. | Fair. |
| 193 | 8 | 4 | Fair. |
| 187 | 9 | .. | Fair. |
| 223 | 10 | 4 | Good. |
| 224 | 10 | 15 | Fair. |
| 180 | 10 | 25 | Getting bad. |
| 221 | 11 | 23 | Getting bad. |

Each one of the seats was put in new when the cars were in the shop undergoing repairs and had the triple valves overhauled, and the appearance of the seats would seem to bear this out. Cars number 221, 223, 224 and 226 were new cars and had new triple valves, so there is no doubt that the seats were new and have been in service the length of time the table shows.

Other brake failures to guard against are cylinder packing blowing, pipes and hose bursting and leaking, branch pipe breaking at triple, besides failure of the regular rod and lever connections, the details of which we will not now go into.

The result of these investigations caused a good deal of concern, and the question has arisen that in case we had appropriations for brake fixtures, how could it be most profitably expended, viz.: in purchasing new brakes, or in rendering effective those which have already been purchased? Some of our master mechanics and road foremen estimated that as high as 20 per cent. of the air-brake equipment passing over our line was either inoperative or not being used. Special attention was then directed to the matter by the superintendents, and all defective brakes were reported. Records were taken by careful men showing for the week ending Dec. 16, in Illinois, in six trains out of a total of 171 air-brake cars, 32, or 18½ per cent, were cut out. A record taken in Iowa is, perhaps, more accurate.

It shows, in seven trains examined, 12 cars cut out from a total of 88, or about 13½ per cent. The Atchison road reports much the same experience, and that it was not unusual in a train of 30 air-brake cars to have 10 cut out, but that since the establishment of air testing and repair plants at terminals the difficulty has been almost entirely removed. The Southern Pacific, Union Pacific and Northern Pacific railroads report a much less per cent. as defective. . . . When a brake on a freight car is cut out and allowed to run in service it should have a card stating what the defect is.

From what has been written it will be seen that when railroads decide to introduce air-brakes under their freight equipment the extra expenditure of money must not be allowed to rest there. Much has still to be done in providing proper facilities and issuing systematic instructions for maintaining them. Further, with a limited number of brakes on any given equipment an expenditure for their maintenance may be more effective in actual number of brakes used than the purchase of additional brakes.

It is confessed that in these days of forced curtailment in expenses the amount of additional work that modern requirements and state enactments impose upon railroads has been viewed with considerable dismay. The accepted theory is that devices popularly coming under the head of "safety appliances" diminish the cost of operating. The hard fact remains that it costs more to live in a finely equipped mansion than in one that is less pretentious. So it is in cost of maintaining rolling stock. Those who guide the financial affairs of railroads well know that it costs more to maintain a modern sleeping car than a chair car, more to maintain a chair car than a plain day coach, and more to maintain a freight car fitted with modern safety appliances than one without them. If those who bring about such requirements also made the returns for their service commensurate with their additional cost, there would be less anxiety for the final results.

### French Locomotives with Corliss Valve Gear.

Fourteen locomotives on the Orleans Railroad, in France, are equipped with a new form of valve gear, devised by Messrs. Durant and Lencauchez, and, from all accounts, have thus far performed very satisfactorily. Illustrations and particulars which are given in the *Revue Industrielle* of Dec. 16, 1893, show the locomotives to be, practically, modified Corliss engines, there being independent admission and exhaust valves at each end of the cylinders, and the valves themselves being of the rocking type. The advantages aimed at are, of course, those incident generally to the use of four-valve engines—independent cut-off and compression, and economy in steam consumption. In looking over the published drawings of the engines, one involuntarily calls back to mind Corliss' original locomotive in this country—the "Advance"—euphoniously nicknamed "The Old Jigger," and run for a short time on the Stonington Railroad back in the fifties. Holley, in one of his speeches before the American Society of Mechanical Engineers in later years, speaking of the engine, facetiously remarked: "'The Old Jigger' had, as nearly as I can remember, 365 valves, one to break down every day in the year, and as to the valve *motion*—well, nobody ever counted the number of its pieces. They were as the sands of the sea shore. Most of them used to jar off the first few trips of the week, after which all the men in the shop could comparatively keep track of the rest of them. I will say for 'The Old Jigger, however, that she made the best indicator card I ever saw from a locomotive—clean cut-off, almost a theoretical expansion curve, and an exhaust as if she had knocked out a cylinder head."

## Metal Underframes for Freight Cars.*

This paper gives a short history of the experience which the Norfolk & Southern has had with some iron tubular cars, and describes an experimental steel car designed and built at its works. This road lies along the seacoast through a country in which the air is heavily charged with moisture, causing the timbers of cars to decay rapidly. As soon as the destructive effect of the climate on timber was observed, steps were taken to avoid the use of material which so quickly deteriorates. The Iron Car Company's cars were brought to the notice of the General Manager, which resulted in leasing 50 flat cars for a period of five years, hoping by actual experience to determine what benefits might be secured from the use of iron frames instead of wood.

I have been studying these cars for the last 3½ years and feel that I have seldom come across a structure in which the details are so well designed. It appears to me that the draftsman was an artist in metal. He showed a profound knowledge of the art of designing malleable iron castings, and every ounce of superfluous metal has been instinctively cut away. Another important feature is the method of joining the various parts together; everything is held in place by bolts and screws, and after five years' service I cannot find a piece loose, nor is there a single hole which is visibly worn out of shape, a result which would have been impossible if rivets had been used. I understand that few railroad officials have a good opinion of tubular iron cars and that they much prefer seeing them on their neighbor's track than on their own. This is due to defects in general design which are fatal under the hard service which cars undergo. It may have been able to stand the shocks received by cars a few years ago, before the yardmen found out how much more the improved appliances would stand without visible breakage. These weaknesses arise from reducing the number of the sills, and by introducing new and untried attachments for the draft gear. The iron car was evidently designed at first to catch a wave of popularity. It was something which could be talked about in a fascinating way, as the tubes of which it is constructed represent to the mind of the uneducated engineer the greatest possible combination of strength and lightness. The sills are constructed of eight tubes placed to form four sills, and designed to carry 60,000 lbs. They are altogether too weak to support such a load, and when the car is loaded uniformly to its full capacity, the sills assume a sinuous or curved line showing their weakness. Another great mistake was the use of four sills instead of the six; it was evidently made in trying to build a car which would be light compared to the load. The absence of center sills necessitated some new design of draft rigging, and it was met by a construction that threw all the pulling strains on the end sills and all the buffing strains on the body bolster, parts which were not strong enough to withstand the heavy service on large roads. The peculiar arrangement of tail bolt and cotter has also given a great deal of trouble. In every-day service it was soon found out that the car was deficient in strength in the places named, and that when they failed much difficulty, trouble and annoyance were entailed in repairing them.

In the *Railroad Gazette* of May 26, 1893, there is an editorial headed "A Suggested Economy in Freight Car Repairs," in which the writer calls attention to the heavy damages sustained by cars in the yards, and forcibly expresses his opinion that they are unnecessary and could be saved by judicious control. How far the idea upon which it is written could be carried out on our larger roads I do not know. Our road is a small one, not overcrowdered with trains, and we are therefore able to cary out the policy indicated. Every case of damage to cars is investigated, and if caused by the carelessness or stupidity of any employee some punishment is inflicted; while, as an incentive to care for the company's property, quarterly premiums are awarded to the train hands giving the most satisfactory service. This watchfulness has been operated under the most favorable circumstances, and we have made it a great success, and are well assured that we have obtained large reductions in cost of maintenance compared with the cost of cars having timber frames.

With the experience obtained in the use of these cars, and by acting upon the suggestions of others in relation to metal frames, we have designed and built a sample steel car which, we think, is very much superior to the iron car of which I have just been speaking. We have sought to obliterate all the weaknesses of the tubular frame, and we feel sure that it is strong enough to withstand the strains to which it may be subjected on any railroad, that it can be maintained in good repair for an indefinite period and with an exceedingly small annual expenditure.

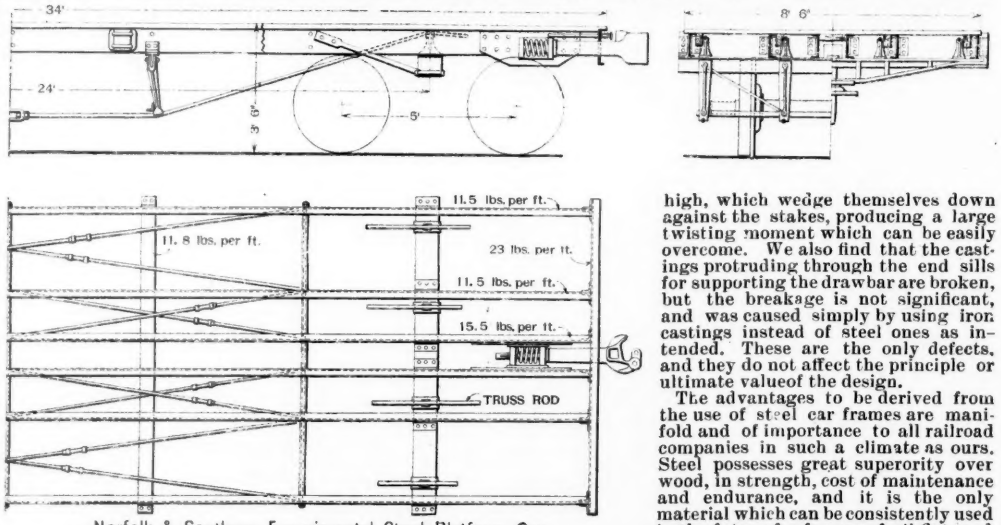
The experimental car which we constructed is shown in figs. 2, 3 and 4, and has six longtitudinal sills made of 8-in. steel channel beams; the side and intermediate sills weigh 11½ lbs. and the center sills 15½ lbs. per foot. The draft gear is placed between the center sills, not below them; the end sills are 12 in. deep so that a sufficiently large hole may be made for the drawbar. The longitudinal sills are tied or braced together tranversely by bolts having distance pieces of gaspipe upon them, and longitudinally by diagonal tie-rods fitted with turnbuckles and with their ends strung on the same transverse bolts with the gaspipe distance pieces, thus tying the six longitudinal sills together in both directions. The body bolsters are of the well-known plate pattern which have been a long time in successful use, the bottom plates of the bolsters being supported by diagonal braces to the center sills (fig. 2). The connections between each sill, and body bolster to sills, are all made by the use of steel angle irons 3½ in. × 3½ in. × ⅝ in. and of ¾ in. turned bolts put in a good driving fit. The sills are trussed by four rods 1⅜ in. diameter and having 1¾-in. screwed ends, with heavy wrought iron plate washers. The needle beams are steel tees 5 in. × 3½ in. bolted to the side sills; the struts are of malleable iron, the whole truss being made very deep. The draft pockets are to be of pressed steel; each pocket is bolted very securely to the centre sill by 10 bolts 1 in. diameter, turned and driven in, forming the strongest attachment ever applied to an ordinary freight car in this country, the bolts having a shearing strength of nearly 400 tons. The follower plates are made as short as possible, of wrought iron 2 in. thick; the regular P. R. R. standard draft spring is used with a supplementary buffing spring behind horn of coupler. The platform is made in four distinct lengths, each length being held in place by six or eight bolts ¾ in. diameter, so that when these bolts are taken out a whole section of platform can be lifted off for examination, painting or repair of platform or sills.

The designs of this car are after certain principles which ought to be embodied in the construction of every metal car frame. I felt that if we adhered to them we could with safety count upon the service which the car would give us. These principles were:

1. That the car should be made strong enough to support the weight it was designed to carry. 2. That only the common rolled sections of steel or plain forgings should be used, except for the draft pockets and such details as are special on timber cars. 3. That no rivet should be used in its construction. 4 That no holes whatever should be allowed in the flanges of the beams. 5. That all work should be first class, equal in quality to locomotive work. 6. That the ultimate weight and cost of the car should be entirely secondary considerations.

First the car should be capable of carrying a load equally distributed over the platform equivalent to the rated capacity. This was carried out by selecting channel irons of such a section that the six sills combined are able to carry with perfect safety a distributed load of 400,000 lbs. on supports placed one foot apart. This weight is 16 times as much as could be supported under the same conditions by the eight tubes composing the sills of the tubular car, which advantage is mostly obtained by putting the same weight of metal per foot of sill into a better form. This shows the weakness of the sills in the tubular car and explains why the tubes become distorted.

The truss of the sills of our steel car is 21½ in. below the sills and its total depth is 28 in. The truss rods are calculated as the tie-rods of a queen truss and entirely support the load between the bolsters. The free ends of the sills which overhang beyond the body bolster are the weakest part of the car, and carry their proportion of an equally distributed load of more than 100,000 lbs. over the whole platform. The struts are inclined to the vertical, so as to bisect the angle formed on the tie-rods, the change being made because it is more correct in theory and more in conformity with the strains transmitted. It may be asked why the frame is made so strong. A car is called upon to resist many heavy strains beyond those required to support its load; it has to stand buffing and pulling strains, corner strains, side strains, torsional strains on side sills, strains reacting through the truck and many others, all of which have their effect upon the various




Norfolk & Southern Experimental Steel Platform Car.

members, which must be made strong enough to resist them. It is not wise to use smaller or lighter beams, the saving effected in weight by using 6-in. beams instead of 8-in. would have been only about 600 lbs. and the reduced cost very little indeed. The enormous weight which the car would carry is mentioned to show what can be effected by using economical sections in the beams and by proper and efficient trussing.

"What is the most desirable, efficient and durable fastening for attaching together the various members of a steel underframe?" This, to my mind, was the most important question involved in the details of the car. The question is one which at first sight appears to have only one answer, and that is to use rivets; but I felt that the conditions obtaining in metal underframes were different from the conditions obtaining in boilers, bridges and ships. My experience with tender frames and freight car trucks led me to the conclusion that rivets are not reliable unless certain conditions are complied with; these conditions are, that the joints or connections between the several pieces should be made large so that many rivets could be used, and that all rivets should be put in by machinery, in order that they may support each other and prevent that first small movement which is so fatal. The conditions which rivets are required to meet in boilers, bridges, etc., are altogether different from the conditions met in car work. In a car frame, and especially the long car frames of this country, the vibration is very great, and the rivets connecting each joint must necessarily be few; there would be a great number of intermittent stresses put upon each rivet, gradually loosening them one by one. I distinctly admit that this would not occur if sufficient rivets could be used, and it is one of the good points of design in the Fox truck that very large joints are made and plenty of rivets used, in contrast to the small number of rivets used in the diamond truck, and which are so difficult to keep tight. As black bolts are out of the question, the most desirable, efficient and durable fastening from every point of view are turned bolts having a good driving fit, the workmanship required being equal in all respects to that put upon locomotives.

To prove that turned bolts are perfectly reliable and efficient, I have only to point to our locomotives and other prime movers, where bolts are subjected to ever-varying strains in intensity and direction, and to the built up car wheels. The bolt adopted on this car is a modified and cheaper form of the bolt used on the Boies steel car wheel, the bolts being parallel instead of taper. This bolt is made long enough to be a driving fit completely through all the plates which are to be connected together, so that however thin the pieces are, the body of the bolt fits perfectly tight into each piece, the screwed part therefore projects beyond, and the nut is countersunk to allow it to be tightened up. Mr. Boies takes great care in the fitting of the bolts, and says that he does not recollect ever having heard of a nut unscrewing or coming off.

No holes should be drilled through the flange of a channel iron, for not only is its strength greatly reduced, but the ultimate breakage is certain to result, starting from that hole; this is especially true of steel beams—it would be exactly like nicking a bar of steel. Some new ideas are therefore introduced for fastening the platform and underrigging to the main frame.

The expense of first-class work, equal in quality to locomotive work, need not be great. Such work can be done very cheaply. With suitable tools and proper organization holes can be drilled for a quarter of a cent each, and bolts can be finished from the forge at less than one cent each, an increased price over black bolts not worth a moment's consideration.

The rule laid down as to the ultimate weight and cost of the car was laid down to escape the temptation to make everything so light and cheap. The dominant idea was to have everything strong enough, leaving the future to disclose what parts might be made lighter and what braces and details might be dispensed with. The result is certainly very satisfactory; the frame with platform weighs only 2,000 lbs. more than the frame of the tubular iron car, the total weight (without brakes) being 20,300 lbs.

Respecting the cost, we are agreeably surprised to find that, although the car is an entirely new departure, the figures submitted agreed with the cost which we had estimated. These figures are very reasonable, and so long as we can get metal car frames made at such prices, we shall never desire to buy wooden ones.

The first test of this car is illustrated in fig. 1 with a load of 147 car wheels weighing 80,000 lbs. The load was left there for 10 days, the car being moved several times through the yard and to the scale track one mile away. At the end of this time the sills were found to have a total deflection of ⅜ in., and when the load was removed a permanent deflection of ¼ in.

The car has now been in constant use for 14 months, and not one cent has been expended for repairs, and not a single bolt or nut has yet become loose. It has been in the shop many times for examination and can discover only one weak place, a slight deficiency in resistance to torsion of the side sills; they are twisted a little by heavy loads of pine logs, three or four tiers high, which wedge themselves down against the stakes, producing a large twisting moment which can be easily overcome. We also find that the castings protruding through the end sills for supporting the drawbar are broken, but the breakage is not significant, and was caused simply by using iron castings instead of steel ones as intended. These are the only defects, and they do not affect the principle or ultimate valueof the design.

The advantages to be derived from the use of steel car frames are manifold and of importance to all railroad companies in such a climate as ours. Steel possesses great superority over wood, in strength, cost of maintenance and endurance, and it is the only material which can be consistently used in the future for frames of all flat and gondola cars, and probably for box cars. I unhesitatingly express my profound convictions that steel frames can be designed and built which will secure economy, efficiency and durability on any road; that designs will develop for cars possessing greater strength and efficiency as experience dictates, eliminating the weak points and proving that steel is the only material which ought to be used for this purpose in this age of steel. The cost of repairs could then be reduced to an extremely low figure.

The writer cites numerous opinions from technical papers advocating the use of steel for car under frames. He mentioned the *Engineering News* of May 19, 1892, the *Locomotive Engineering* for August, 1893, the *Railway Age* and the *Railroad Gazette* of June 9, 1893. He mentions the report of the Master Car Builders' Committee at the last convention and gives abstracts from correspondence with the German Railroad Commission and Western railroads of France. The author gives some interesting statements as to the cost of repairs of these 50 iron flat cars for three years; leaving out wrecks, wheels and brasses they amount to $163 32, or an average of $1.10 per car per annum. The platforms, however, need repairs and the ironwork a coat of paint. These he compares with the cost of maintenance of wooden and other cars, and with 50 wooden cars operated upon the Norfolk & Southern road for the same three years, which gave an average cost of $17.76 per car per annum, 17 times as much as for tubular iron cars.

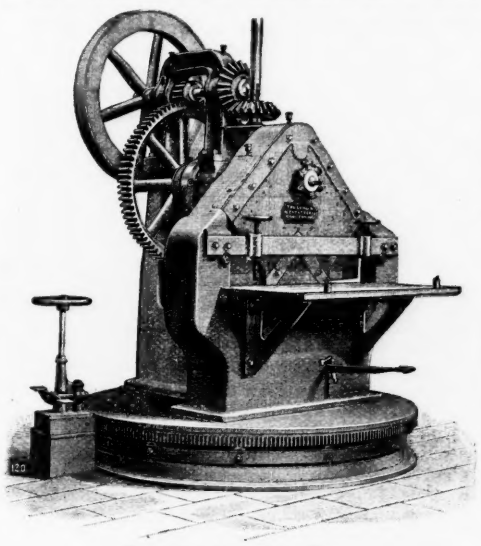
The paper is concluded by a firm expression of belief that the metal frames are superior to wooden ones, and if built to suit the heavy traffic of to day and with strength commensurate to the work and abuse to which they are subjected that it will not be long before the metal frame will triumph.

This paper brought out a good deal of discussion from members of the club present. There was considerable difference of opinion as to the use of bolts in place of rivets. Members took occasion to correct the impression that the nuts of bolts did not come loose in steel tired wheels and on tender trucks. While the paper on the whole was highly complimented there was considerable criticism upon steel under-frames in general. One point in particular brought out was the rusting out or eating away of metal under-frames of gondolas carrying soft coal. Its effect upon tender frames and upon rails where cars have stood for weeks was mentioned as illustrations of this destructive effect of the acid leechings. There was considerable discussion on the subject of repairs to iron metal frames and especially of the tubular iron car, it being the experience of many men present that it was well nigh useless to attempt to repair them; that when they had been through a wreck they might about as well be thrown away, and this matter of repair was offered as a point to be considered in the design of metal under-frames.

* Abstract of a paper read before the New York Railroad Club, Jan. 19, by Mr. G. R. Joughins, Superintendent of Motive Power, Norfolk & Southern.

### Angle Iron Shear Mounted on Turn-Table.

The machine illustrated herewith is designed for shearing bars of angle iron or steel, either square or at right or left angles, without swinging the bars or turning them end to end, thus permitting long work to be done in narrow shops. The machine has capacity to cut angles 6 in. × 6 in. × ¾ in. thick, or less, and is provided with a double set of shearing blades. It is operated by a heavy steel cam shaft, so arranged that it can be



Revolving Angle Iron Shear.

turned by hand from the front for adjusting the shear blades. An iron table is provided having gages and clamps for holding the bar while being sheared. The machine is mounted on a turn-table and driven through a vertical shaft, so that it can be swiveled entirely around and faced in any direction, permitting shearing to be done at any angle without moving the bar. The illustration shows the machine belt driven, but a steam engine is attached where it is desired. The machine is made by the Long & Allstatter Co., Hamilton, Ohio.

### Chicago Traffic Matters.

*Freight Traffic.*—The only favorable feature of the movement of freight from the country over the Granger roads the past week compared with the one immediately preceding was the increase in live stock deliveries here and at other leading Western points; but these gains were more than offset by the decrease in flour, grain and miscellaneous traffic, the aggregate deliveries by 11 leading roads being 2,497,000 bush., against 2,654,000 bush. the previous week, and 3,904,000 the week ending Feb. 4, 1893. There is an abundance of produce in the interior, but holders will not sell at current low figures. Many well informed railroad managers estimate that while their receipts the coming six months are likely to exhibit a considerable falling off from the first half of 1893, they will show little shrinkage compared with a series of preceding years.

Outbound business continues to show a fair improvement. Trade prospects are materially brightening. The largest gains the past week were by the railroads leading South and Southwest, where the spring trade opens earlier than in the Northwest. As yet, however, business shows a decline compared with a year ago.

The deliveries of flour at Chicago by the leading Western railroads for the week ending Feb. 3, and for the corresponding time the two preceding years compare as follows:

| | 1894. | 1893. | 1892. |
|---|---|---|---|
| | Barrels. | Barrels. | Barrels. |
| C. & N. W. | 16,174 | 34,154 | 20,179 |
| Ill. Cent. | 300 | 900 | ..... |
| C., R. I. & P. | 2,450 | 4,350 | 2,350 |
| C., B. & Q. | 8,504 | 21,968 | 21,245 |
| C. & Alton | 950 | 4,505 | 775 |
| C. & E. Ill. | 150 | ..... | ..... |
| C., M. & St. P. | 13,200 | 37,750 | 25,475 |
| Wabash | 150 | 1,700 | 1,460 |
| C. & G. W. | 8,316 | 17,185 | 14,938 |
| A., T. & S. Fe | ..... | 600 | 105 |
| Totals | 50,194 | 123,112 | 86,527 |

The deliveries of grain at Chicago by the leading Western railroads for the week ending Feb. 3 and for the corresponding time the two preceding years compare as follows:

| | 1894. | 1893. | 1892. |
|---|---|---|---|
| | Bushels. | Bushels. | Bushels. |
| C. & N. W. | 375,000 | 945,000 | 559,000 |
| Ill. Cent. | 232,000 | 383,000 | 221,000 |
| C., R. I. & P. | 253,000 | 324,000 | 476,000 |
| C., B. & Q. | 561,000 | 833,000 | 538,000 |
| C. & Alton | 174,000 | 127,000 | 158,000 |
| C. & E. Ill. | 51,000 | 229,000 | 54,000 |
| C., M. & St. P. | 585,000 | 426,000 | 454,000 |
| Wabash | 84,000 | 141,000 | 55,000 |
| C. & G. W. | 65,000 | 193,000 | 98,000 |
| A., T. & S. Fe | 116,000 | 305,000 | 164,000 |
| L., N. A. & C. | 1,000 | ..... | 3,000 |
| Totals | 2,497,000 | 3,904,000 | 2,780,000 |

The following shows the deliveries of flour at Chicago by the leading Western railroads for the month of January and comparisons with the two preceding years:

| | 1894. | 1893. | 1892. |
|---|---|---|---|
| | Barrels. | Barrels. | Barrels. |
| C. & N. W. | 90,248 | 119,468 | 184,342 |
| Ill. Cent. | 2,100 | 1,650 | 539 |
| C., R. I. & P. | 141,450 | 25,950 | 6,250 |
| C., B. & Q. | 41,348 | 59,892 | 102,125 |
| C. & Alton | 9,950 | 13,255 | 8,480 |
| C. & E. Ill. | 1,350 | 750 | ..... |
| C., M. & St. P. | 101,400 | 114,325 | 111,275 |
| Wabash | 1,050 | 6,800 | 3,790 |
| C. & G. W. | 63,421 | 64,992 | 84,374 |
| A., T. & S. Fe | ..... | 1,500 | 329 |
| L., N. A. & C. | ..... | ..... | ..... |
| Total | 452,317 | 408,582 | 501,504 |

The following shows the deliveries of grain at Chicago by the leading Western railroads for the month of January, and comparisons with the two preceding years:

| | 1894. | 1893. | 1892. |
|---|---|---|---|
| | Bushels. | Bushels. | Bushels. |
| C. & N. W. | 3,613,000 | 3,032,000 | 2,280,000 |
| Ill. Cent. | 2,455,000 | 1,631,000 | 1,072,000 |
| C., R. I. & P. | 2,048,000 | 1,630,000 | 1,289,000 |
| C., B. & Q. | 3,811,000 | 3,702,000 | 2,513,000 |
| C. & Alton | 672,000 | 510,000 | 614,000 |
| C. & E. Ill. | 346,000 | 760,000 | 315,000 |
| C., M. & St. P. | 2,125,000 | 2,375,000 | 2,454,000 |
| Wabash | 591,000 | 361,000 | 165,000 |
| C. & G. W. | 545,000 | 896,000 | 441,000 |
| A., T. & St. Fe | 606,000 | 985,000 | 597,000 |
| L., N. A. & C. | 18,000 | 1,000 | 8,000 |
| Total | 16,830,000 | 15,886,000 | 11,548,000 |

The following table shows the total number of cars of live stock received at Chicago for the month of January, with comparisons with the two preceding years:

| | 1894. | 1893. | 1892. |
|---|---|---|---|
| A., T. & S. Fe | 1,027 | 760 | 1,341 |
| C., B. & Q. | 6,824 | 5,440 | 7,220 |
| C., R. I. & P. | 2,698 | 2,627 | 3,088 |
| C. & N. W. | 4,914 | 4,946 | 6,183 |
| C., M. & St. P. | 4,462 | 4,108 | 5,066 |
| C. & E. Ill. | 517 | 500 | 491 |
| C. & Alton | 1,886 | 1,806 | 1,472 |
| Ill. Cent. | 2,395 | 2,009 | 2,800 |
| Wabash | 1,594 | 1,290 | 1,191 |
| C. & G. W. | 872 | 660 | 1,123 |
| L., N. A. & C. | 148 | 135 | 127 |
| Wis. Cent. | 445 | 186 | 164 |
| Others | 223 | 221 | 187 |
| Total cars | 28,005 | 24,654 | 30,487 |

Receipts of cattle, hogs and sheep at the four leading Western markets for January, 1894, with comparisons:

| | Cattle. | Hogs. | Sheep. |
|---|---|---|---|
| Chicago | 234,658 | 787,381 | 207,722 |
| Kansas City | 147,100 | 225,500 | 42,700 |
| Omaha | 64,608 | 114,280 | 24,882 |
| St. Louis | 58,952 | 133,739 | 26,925 |
| January, 1894 | 525,318 | 1,260,900 | 301,629 |
| January, 1893 | 531,965 | 1,008,987 | 257,000 |
| January, 1892 | 455,953 | 1 560,263 | 205,686 |

The shipments of live stock from Chicago by the eastbound railroads for the month of January for the past four years compare as follows:

| | 1894. | 1893. | 1892. | 2891. |
|---|---|---|---|---|
| B. & O. | 338 | 591 | 571 | 677 |
| C. & Grd. Tr. | 1,760 | 1,173 | 1,240 | 1,436 |
| C. & Erie | 352 | 247 | 391 | 19 |
| L. S. & M. S. | 1,943 | 1,697 | 2,346 | 2,475 |
| Mich. Cent. | 470 | 1,387 | 996 | 863 |
| N. Y. C. & St. L. | 295 | 244 | 1,587 | 1,223 |
| P. C. C. & St. L. | 107 | 190 | 181 | 91 |
| P., Ft. W. & C. | 1,189 | 927 | 1,404 | 1,289 |
| Total cars | 6,394 | 6,456 | 8,716 | 8,073 |

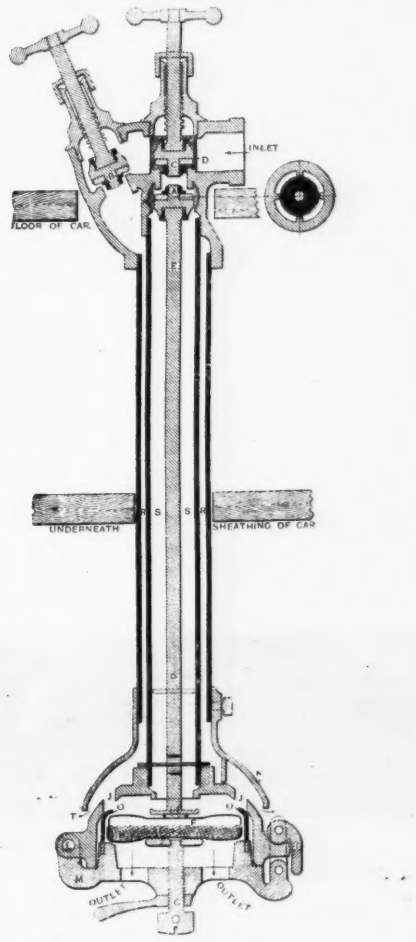
*Passenger Traffic.*—The condition of the Western railroads centering here can scarcely be considered satisfactory. The Atchison, Topeka & Santa Fe reports a large Pacific Coast business and a fairly good local traffic. The Chicago & Northwestern has a very good Colorado, Utah and California patronage, but its northwestern traffic is reported unsatisfactory. The St. Paul also reports all classes of travel moderate. The Chicago, Burlington & Quincy's passenger earnings are below those of a year ago. The decrease in the road's expenses in January compared with the corresponding month last year will be quite as marked as that shown in the report for December, The General Passenger Agent of the Chicago & Alton says: "All descriptions of through business are very light, but local business shows some improvement over the earlier weeks in the month." The Illinois Central, and Louisville, New Albany & Chicago are each said to have made fair gains in through travel. General Manager St. John, of the Chicago, Rock Island & Pacific, said: "Passenger business is moderate, but traffic shows an improvement within the past week, and the outlook for business is less gloomy than painted by those who always look on the dark side." The fact that the estimated net earnings of the Rock Island for January are reported as only $67,000 less than the same month last year, despite a heavy shrinkage in gross receipts, shows that the operating expenses have been closely looked after.

### The Gold Improved Steam Traps and Blow-Off.

The usual form of steam trap and blow-off used in car heating systems is of such design that either both must be placed inside of the car to prevent the trap and valve from freezing, or the entire apparatus must be placed outside the car, and carefully handled to keep it from freezing. An improved trap of recent design is shown in the illustration.

The trap is placed in a vertical position, with the automatic valve inside the car, and the trap extending down through the floors; the expansion device is at the bottom, and when the trap is in position, is outside of the car. Connection between the expansion device and the valve is obtained by means of the rod *E*, which rests on the expansive diaphram *F*; at the upper end of the rod is the automatic valve *A*. The expansive device consists of the phosphor bronze diaphram *F*, which is about half filled with a solution of alcohol and resin and hermetically sealed. The solution is highly expansive when heated. The total movement of the diaphram is between ¼ and ⅜ of an inch between the extreme of temperature usually experienced.

The method of operation of the device is as follows: When the trap is not in operation the diaphram *F* is in its contracted condition and the valve *A* has fallen from its seat. When steam is turned into the heating pipes the water that has lodged in them is forced through the




Gold's Improved Steam Trap.

valve *A* and flows down the pipe *S* and finally escapes through the openings in the bottom of the trap. As the temperature in the outflowing water increases the liquid in the diaphram *F* expands and, raising the rod *E*, closes the valve *A* against its seat. The diaphram becoming cool again contracts, the valve *A* falls from its seat and the accumulated condensation allowed to escape. Generally after the second opening the valve adjusts itself so as to allow a continuous stream to flow from the trap.

In the bottom of the casing which incloses the expansive device are holes through which the water escapes; such location of the draining holes makes it impossible for water to lodge inside. In the top of the same casing are other holes, *J*, to provide for ventilation around the diaphragm and increase the sensitiveness of the trap. The expansion is adjusted by means of the screw *G*, and when once regulated needs little attention. The blow-off valve *B* is provided so that the apparatus and heating system may be quickly relieved of pressure or condensation. When the valve is open the discharge passes down between the two pipes *R* and *S* and out through the openings *T;* the bell-shaped casting gives such discharge a more downward course than it would otherwise pursue after leaving the pipe, and the shape of the casting makes it an excellent aid to ventilation, as it is practically half of a "Globe" ventilator. The valve *C* is provided for such roads as prefer some means of confining the condensation in the pipes when the temperature in the car gets too high. *D* is a strainer to protect the valve and seat *A* from scale and other obstructive particles. The cover of the trap is hinged at *L* and locked on the opposite side by the cam lock *L*.

All parts of the trap are held securely in place independent of the cam lock, so that when the cover is opened they cannot fall from their places.

The feature of this trap is that the automatic valve and the expansion device are separated in such a way that the former is located inside the car and all the water retained by it in the pipes is inside the car, where least liable to freeze; the expansion device is located outside, out of the way, and where the cold air may cause it to contract quickly. When expansion devices are placed inside, the more even temperature of the car causes them to act more sluggishly.

The trap shown is known as the Gold improved steam trap and blow off, and was designed by Mr. E. H. Gold, Western representative of the Gold Car Heating Co. The severe tests given the trap last winter gave the company such satisfaction that they now feel justified in putting it upon the market.

## A Large Testing Machine.

The testing machine illustrated is the property of the Phœnix Iron Company, and is situated at the company's works, Phœnixville, Pa. It was designed and built to test full sized eye-bars and for making tension and compression tests of the members of bridges and buildings.

To give an adequate conception of the capacity of this machine a description of its component parts is given in order. The large double acting cylinder is made of steel, and is 7 ft. 10 in. long, 64 ins. diameter and weighs 10 tons. The heads weigh about four tons each, and are removable, being bolted to the cylinder by 80 2½ in. turned studs. The piston is of cast steel, has a stroke of 6 ft. 6 in , and is fitted with brass glands to make it absolutely water-tight. Four steel piston rods 8¼ in. diameter provided with brass glands for packing are bolted to the piston, pass through front cylinder head and connect with crosshead. This crosshead is of cast steel and weighs about four tons. It works on two 6-in. steel guides, fitted with phosphor-bronze bushings. The slot hole in which bars are pinned preparatory to testing is 4½ in. wide, and is capable of receiving a head 15 in. from center of pinhole. The pinholes are bored out to 10 in. diameter, and by means of bushings can be reduced to any size desired. On the inside of crosshead and on nearer cylinder head are two 18 in. faced disks between which small compression tests are made. Pieces not over 6 ft. long and 18 in. diameter can be compressed in this way very easily, as in making such tests the machine is used as in tension.

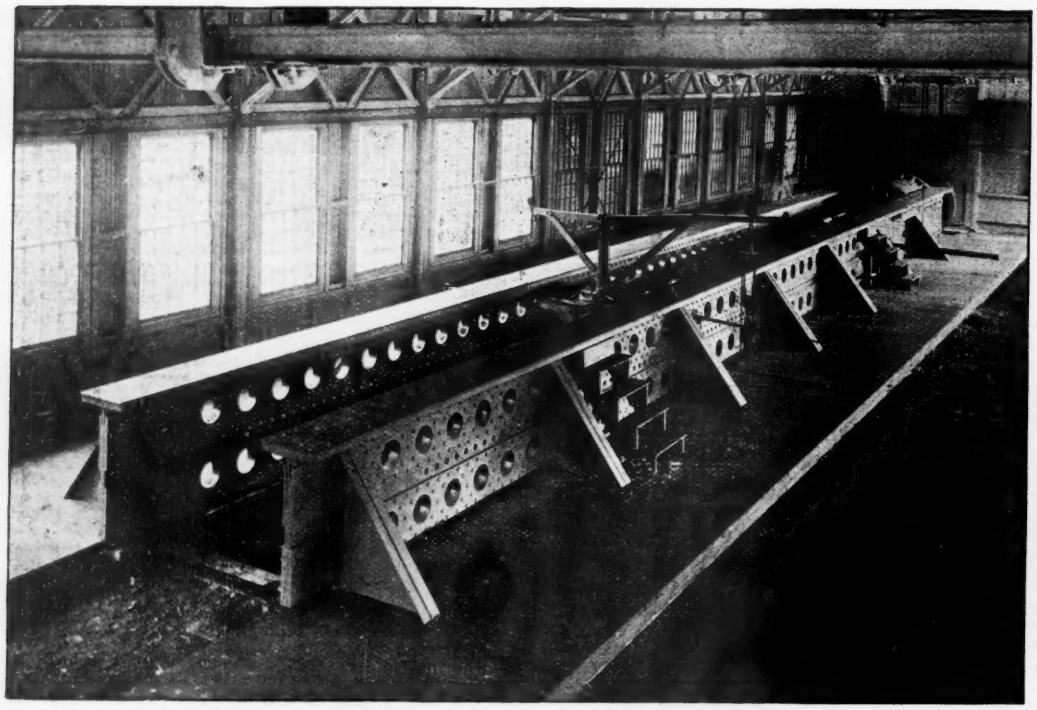
The rear crosshead is practically a counterpart of the front, but is connected with an anchor tail block weighing some eight tons, both of which are mounted upon 12-in. cast steel wheels and run on a track extending the entire length of the machine. The connection consists of four 8⅛-in. steel rods which are threaded at both ends. At the tail block end an arrangement of gears is placed by which the distance separating the crosshead and the tail block can be shortened or lengthened at will. Between the four rods and centrally placed is a 6-in. steel rod made fast in the crosshead, which passes through a friction box in the tail block. The fit is a tight one, and when the rupture of a test bar takes place the crosshead recoils gently. The tail block is provided with four 9.56-in. pinholes (two on a side) which receive the anchor pins passed through the girders. These pins are made of hard steel and weigh about 300 lbs. each. A two-jib 1,000-lb. hand crane is provided for handling the anchor pins.

The girders, I-shaped, are built of steel, are 78 ft. long, 52 in. high and weigh 60 tons. They are built up of webs, 4.12 in. thick. The top and bottom flanges are made of 6 × 6-in. angles and cover plates 18 in. wide. The girders are held together by ⅞-in. rivets 3 in. apart and strengthened by 14 strong plate-angle brackets. The anchor pinholes, 9.56 in. in diameter, are bored out with 18-in. centers lengthwise and 24 in. centers crosswise. Two-inch holes between the large holes crosswise serve for the introduction of a bar to tap in and out the pin holding the test piece. The girders and brackets rest upon and are securely riveted to seven cross girders, likewise built of steel, 15 ft. long, 15 in. high and 7.5 in. across flanges. At one end of the long girders the cylinder is secured by means of 80 turned and fitted bolts, 2 in. in diameter.

The combined crosshead and tailblock is moved on its track by a two-ton two-speed hand windlass placed on a strong foundation a few feet back of the machine by means of chains and chain sheaves. A double action hydraulic pump working at a pressure of 850 lbs. per sq. in. supplies the cylinder, and the pressure exerted on test bar is recorded on a mercury gage which registers up to the capacity of the machine.

The whole machine, weighing approximately 100 tons, is placed on a heavy stone foundation and held down by large anchor bolts and cast iron anchor plates. The total capacity of the machine is 2,160,000 lbs. Allowing for a stretch of 17 per cent. in parallel section, an eye-bar 50 ft. long can be broken. By a special arrangement of links extending from the crosshead, bridge members and other sections too large to be admitted by slot holes can easily be tested, provided they do not exceed 40 ft. in length.

The Phœnix Iron Company has lately been making a special feature of testing, in tension and compression, of all sorts of materials, and has introduced a great many facilities for the quick handling and accurate execution of tests.



Phœnix Iron Co.'s Hydraulic Testing Machine.

The results of some tests of full-sized yellow pine piles recently made on this machine are given in the following table:

| Test No. | P., in. | B., in. | L., ft. | Load carried without material deflection, lbs. | Yield point failed by deflection. Lbs. |
|---|---|---|---|---|---|
| 1 | 10⅜ | 14¼ | 45.53 | About 70,000 | 103.265 |
| 2 | 9⅝ | 14¼ | 45.61 | " 65,000 | 88,745 |
| 3 | 11⅛ | 14¼ | 24.35 | " 225,000 | 251,705 |
| *4 | 10⅜ | 12 | 15.80 | " 250,000 | 267,840 |

* This test piece failed by crushing fibers about 2 ft. from small end.

Tests 3 and 4 were from pieces cut from test pieces 1 and 2.

The Phœnix Iron Company keeps on hand a full equipment of pins, bushings and attachments for all sorts of tensile and compression tests, and will make such tests on short notice.

## English Tests of Car Axles.

*The Engineer* of Dec. 29 gives the results of tests of wrought iron railroad car axles by Thomas Andrews, M. Inst. C. E., of the Wortley Iron Works, Sheffield. The author has enjoyed an experience of about 30 years in the manufacture and testing of axles, and his observation should be of value. What has been sought in the manufacture of car axles is toughness and tenacity of material combined with the necessary amount of hardness needful for the profitable and economical wear of the journals. Great care has been exercised to prevent the rigidity of the material approaching brittleness.

The specifications made by the railroad companies in England contain the following clauses: "Each (steel) axle is guaranteed to stand a tensile strain of not less than 35 tons per sq. in. with 25 per cent. of elongation, the test length to be 3 in." "Each (wrought iron) axle is guaranteed to stand a tensile strain of 22 tons per sq. in., 25 per cent. elongation, test length to be 3 in."

The author, after careful consideration of these tests from a metallurgical aspect, is of the opinion that the requirements of the above tests are fixed higher than the nature of the material or the limits of safe working will justify or require. He does not think that the nature of the material has been sufficiently considered; that there is danger of the material becoming too rigid, thereby inducing brittleness or crystallization in service; that the test specified is equal to that frequently required for the best wrought iron rolled bars, and that hammered wrought iron in sizes 4½ to 5½ in. diameter are not to be compared with smaller rolled bars, the tensile strength of iron being less in proportion to the size to which it is finished. The results of actual tensile tests of wrought iron axles and forgings made by Mr. David Kirkaldy at different times within the last 27 years are given in a table, and for comparison a table of tests made by the author is given, which he compares also with the tensile strength of American and Swedish axles.

The author, as the result of considerable metallurgical experience, maintains that wrought iron axles ought not, in the interest of public safety, to be tested up to a tensile strength of 22 tons per sq. in.; that in making axles to meet such a test it is necessary to work the iron to a detrimental state; that the prolonged and excessive hammering and working which are required to obtain wrought iron forgings of so high a tensile strength is decidedly objectionable and injurious to their subsequent wear and tear; that it tends to induce brittleness in its subsequent behavior. He claims that to meet the high tensile requirements of the specifications it is necessary for the iron to be previously worked into a high state of crystalline formation. He does not consider it wise or safe that tests should be necessary which require axles to be of a crystalline nature at the commencement of their service. Above all things an axle ought to possess a fibrous structure, because it tends to become more and more crystalline in service by reason of the constant jars and concussions. As evidences of this crystalline structure the author referred to numerous papers before the Institute of Civil Engineers, the Iron and Steel Institute, and to the presence of very large facets found in iron which no doubt at one time was fibrous. The author cites an instance in which a Bessemer steel axle of a car snapped into four pieces and he attributes the breaking to the use of axles of high tensile strength. Specimens taken from this axle which broke gave 42.52 tons breaking strength, and an extension of 10 per cent. without any contraction of area. The fracture was coarsely granular. Several pieces were subjected to bending tests, which they did not stand at all well, but after annealing in the usual way they were very much stronger in a bending test. The broken axle contained less than 0.38 per cent. of carbon.

The author makes as a suggestion for tensile tests of wrought iron axles that they be subjected to a test of not more than 20 tons per sq. in. and that the efficiency of axles is amply assured by the severe drop tests to which they are subjected, which he thinks are also excessive and suggests as a desirable change that axles be capable of standing five blows from a 2,000-lb. weight falling from a height of 20 ft., the bearings to be 3 ft. 6 in. apart and the axle turned after each blow. He would add to these suggestions that under a tensile test the axle should stand an elongation of 20 per cent., pieces to be 3 in. long. The author then alludes to the tests required in American practice which are very similar to what he recommends. By way of explanation it should be said that an English axle when tested is from 4½ to 5⅓ in. in diameter.

## Industrial Conditions in Mexico.

Mr. John Birkinbine, the well known iron expert, has a very good article under this heading in the *Engineering Magazine* for this month.* The population of Mexico is placed at 11,600,000 souls on 767,206 square miles, or 15 per square mile. But the 11 central states, with only 18 per cent. of area, are inhabited by nearly 50 per cent. of the population. A circle centering in the City of Mexico, with a radius of 200 miles, taking in Vera Cruz and Acapulco, would embrace a population of fully 5,000,000.

The *Two Republics*, an English newspaper published in the City of Mexico, is quoted as saying: "It is officially announced that the average daily wages in this country is 27 cents. This is probably at least 10 cents more than it was 20 years ago." The cents referred to are centavos, or hundredths of the Mexican silver dollar, which would make the average wages about 18 cents in United States currency. This sum is rather small as

* Mr. Birkinbine had also an extended article on Engineering in Mexico in the July (1893) number of the Proceedings of the Engineers' Club of Philadelphia.

compared with other estimates, but if work for 300 days is allowed at the rate mentioned it may be correct. In this connection it is of interest to note that the invoice value of goods imported into Mexico for the fiscal year 1889-90, the last year for which returns are at hand, was $52,018,658. This would give about $4.48 per capita, which seems a very large proportion of such earnings. The very low wages which are undoubtedly paid in Mexico abundantly justify the retention of the primitive methods of doing work mentioned by Mr. Birkinbine, and the absence of labor-saving machinery in many large enterprises. As a matter of fact, intending investors might advantageously call in "another man" when they are proposing to put money into a Mexican enterprise which is to be made successful by the introduction of costly or heavy machinery.

The total cost of the 6,389 miles of railroad in Mexico is given as $200,000,000 of which $76,000,000 was advanced by the government. Mr. Birkinbine gives a very instructive set of profiles of six railroads which start from either the Gulf of Mexico or the Rio Grande and reach the central tableland, and also a profile of the road from Nogales to Guaymas, on the Gulf of California. These are all contained in a space of 4 × 7 in., and they cover more information than could be conveyed by many pages of text. These profiles, with a knowledge of the position of ores, coal, wood and water, give one a key to the industrial possibilities of the larger part of Mexico. The economics of that part of Mexico south of the City of Mexico, nearly all of which, except a portion of Yucatan, is almost a terra incognita, is not touched upon, as there are no industries there, except in Yucatan.

The principal investors in Mexican enterprises are Americans and Englishmen. The Germans, French and Spanish are generally storekeepers, and are apt to take their earnings out of the country whenever a rise in the price of silver renders it profitable to do so. The development of the country has been made by the investment of American and British money. The first railroad, from Vera Cruz to Mexico, was built by English money. The Mexican Central, the Mexican National and the Sonora railroads were commenced about 1880 chiefly with American capital and under American control. The Hon. John Bigelow's article, The Railway Invasion of Mexico, in *Harper's Magazine*, which was published in the summer of 1882, developed a distrust of Mexican investments, and our people unloaded on the English, with the result that the management of the Mexican National passed entirely into their hands and the Mexican Central has since been largely influenced, if not controlled, by them. Since that the Mexican International, Eagle Pass to Durango, has been built by American capital, while the Interoceanic, Monterey & Mexican Gulf and the Oaxaca Railroad have been built and are controlled by British capital, which thought at one time to dominate the country. But lately much more American than British capital has been entering Mexico. The following table shows the number of companies reported as organized in the two countries, with their capital, for operation in Mexico:

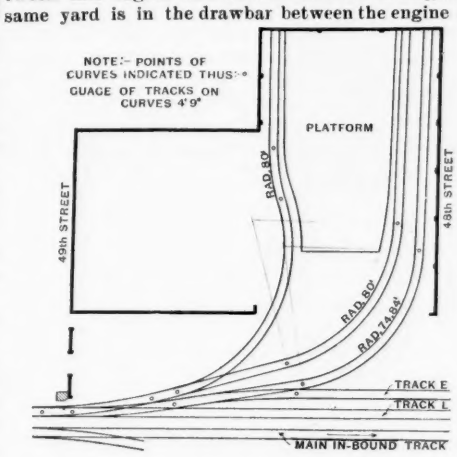
| Year. | United States—Number of Companies. | United States—Capital. | United Kingdom—Number of Companies. | United Kingdom—Capital. |
|---|---|---|---|---|
| 1890 | 31 | $158,805,000 | 41 | $56,000,464 |
| 1891 | 38 | 70,535,000 | 20 | 18,486,416 |
| 1892 | 50 | 91,625,000 | 9 | 10,736,000 |
| 1893 | 30 | 34,580,000 | 15 | 4,280,097 |
| | 149 | $365,545,000 | 85 | $89,502,977 |

Between the increased facilities for transportation and the larger investments of American money our exports to Mexico have more than quadrupled. For the fiscal year 1879-80 our total exports to Mexico, as shown by the report of the Bureau of Statistics, were valued at $7,209,593; while for the fiscal year 1889-90 the Mexican custom-house returns show an importation for this country with an invoice value of $29,080,276, or 55.92 per cent. of the total imports. The British follow us with $8,535,370, or 16.40 per cent. So that these two countries, which furnish Mexico with the greater part of their industrial capital, also furnish her inhabitants with nearly three-quarters of their foreign merchandise. We are also the two countries which, more than any others, control the means of transportation to that country.

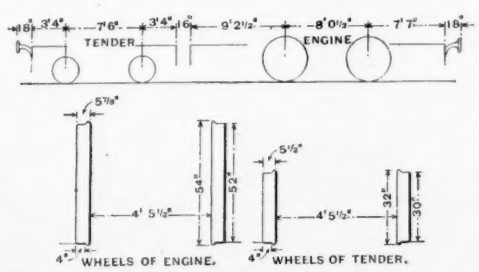
## A Sharp Curve in the Grand Central Yard.

The diagram printed herewith, fig. 1, shows the arrangement and location of three tracks lately laid on the east side of the yard at the Grand Central Station, New York City, to connect with a new freight house of the Adams Express Company, which has just been built there. As the curves in these tracks, though very sharp, are regularly traversed by a locomotive, the case affords a pertinent answer to the question often asked, how short a curve can be operated without difficulty?

Baggage cars 50 ft. long have to be run over these 75-ft. and 80-ft. curves several times every day, and they are handled by one of the new switching engines (No. 2) recently built for the Grand Central Station by the Schenectady Locomotive Works. The principal dimensions of this engine, affecting its adaptability to sharp curves, are as follows (see figs. 2 and 3): Driving wheels, four, diameter 52 in.; wheel base, 8 ft. ½ in.; tender wheels, four, diameter 30 in.; wheel base, 7 ft. 6 in. The wheel gage inside the flanges is 4 ft. 5½ in. and the tires are 5½ in. wide. The gage of the track on the curves is made ½ in. wider than the standard, or 4 ft. 9 in. The only difference between this engine and several others working in the same yard is in the drawbar between the engine and tender, which has been lengthened so as to keep the engine frame and the tender frame 1 ft. 4 in. apart.




Sharp Curves—Grand Central Station, New York.




Wheel Base of Engine for Running on Sharp Curves.

Chief Engineer Katte informs us that these tracks have now been in use several weeks and with entirely satisfactory results.

## Foreign Railroad Notes.

The "penny-in-the-slot" apparatus has been arranged to deliver tickets on the Berlin Elevated Railroad. There are tickets for two classes and of different rates for different distances on the road, but the apparatus supplies only second-class 15 pfennig (3.6 cents) tickets. You put two 10-pfennig pieces into the slot, and take out a ticket and a 5-pfennig piece.

The German railroads allow the consignee of carload freight 12 hours to unload a car, counting from the time he is notified of the arrival of the car. When a notification is sent by mail, it has therefore been the rule to assume the notice to have been received three hours after posting it. Complaints having been made that notices posted late in the day left insufficient time, the Berlin Directory of the Prussian State Railroads has issued regulations as follows: When notices of arrival are mailed later than 4 p. m., and under the postoffice regulations should be delivered either the same day or before 7 a. m. the next morning, then the 12 hours allowed for unloading will be counted from 7 a. m. of the first working day after mailing the notices, and will expire at 7 p. m. of that day. If the notices are mailed after 4 p. m. on a Saturday or other day before a holiday, and are delivered by the postoffice on the Sunday or holiday, the time for unloading will likewise begin at 7 a. m. of the next working day. But should the notices so mailed after 4 p. m. be delivered by the postoffice after 7 a. m. of the following working day, the 12 hour period will be extended three (daylight) hours, just as when the notice is mailed between 7 a. m. and 4 p. m.

The Wurtemberg State Railroads introduced, Dec. 15 last, two new kinds of passenger tickets. One is similar to the new Belgian season tickets for 45, 30 and 20 marks ($10.80, $7.20 and $4.80), for the three classes respectively, a ticket is sold which entitles the holder to travel for two weeks whenever and wherever he pleases on the Wurtemberg system, the tickets being good not only on ordinary passenger trains, but on express trains, on which the ordinary tickets cost one-fifth more.

The other innovation consists of ticket books containing tickets for 30 trips between any two designated stations, good for one year, sold at a reduction of one-third from the regular fares, and issued for all classes, and for ordinary and fast trains. These book tickets are good for all members of the holder's family as well as himself, whether he travels with them or not. But when several persons travel on them at once, they must all ride in the same car, and so far as possible in the same compartment. In fact, this kind of "book ticket" is sufficiently familiar here. With regard to the cheap fortnight tickets, it must be remembered that Wurtemberg is not quite so large as Massachusetts.

Even the German legislator longs to ride without paying. For the four sessions after the first, members of the Imperial Diet had that privilege by law on all railroads in the empire, though only during the session. Then the privilege was reduced to a free pass between Berlin and the member's home. Last December a delegate moved to request the Chancellor to restore the old privileges, and his motion was carried by a great majority. It is said, however, that there is very little chance of the request being granted. It is suggested that a compromise be made by adding the right to ride free between Berlin and the districts which they represent, which may be far from the districts where they live.

The Prussian state railroads have heretofore recognized employees (laborers) who have served satisfactorily for 25 years by a reward of 30 marks ($7.20), while those who have served 35 years get 60 marks ($14.40). It is now decided to give men who have given faithful service for 50 years the sum of 100 marks ($24), unless some other distinction is allotted them. It is doubtful whether the average American railroad man could be tempted to be good by a prospect of 30 cents a year at the end of 25 years, even when supplemented by 41 cents a year more at the end of 35 years, and 48 cents a year at the end of 50 years; but probably if he got even a small sum without expecting it he would be pleased; and it is certainly a good thing to recognize long and faithful service. In 1892 the Prussian state railroads gave rewards to 1,147 laborers (not regularly appointed employees) after 25 years and to 314 after 35 years' "blameless service."

The General Inspection (government) of the Austrian railroads urges the various railroad managements to make systematic experiments with electrical car-lighting appliances, for the sake of safety, referring particularly to a recent accident near Milan, where many passengers were burned to death in a wreck kindled by the car lamps.

It is reported that on several Russian railroads where very few passengers travel first-class, that class will be abolished. Probably this could be done with an increase of profits on half the railroads of Europe.

Denmark introduced "standard time" (Central European) Jan. 1, for the whole country except the distant Faroe Islands. The clocks had to be set forward 9 minutes and 41 seconds.

What is for Russia an unusual number of new railroads were opened last November. One 140 miles long belonging to the Southwestern system; another, 88 miles long, east of Warsaw; a third, 25 miles of narrow gage line, and a fourth, perhaps most important of all, the 166 miles of the branch of the Vladikaukaz Railroad eastward along the northern foothills of the Caucasus to the Caspian Sea at Petrovsk—the first rail connection of the Russian railroad system with the Caspian, the line from the Black Sea to Baku being separated from the other Russian railroads by the mighty range of the Caucasus, while the Volga has been the only transportation route to and from the Caspian. The Moscow newspapers notice among the first shipments over this new line 23 carloads of cotton, coming from Bokhara, far away to the east of the Caspian and just north of Afghanistan, brought by the Trans-Caspian Railroad and by steamboats across the sea. At Petrovsk, the Caspian terminus of the new road, which is about 200 miles northwest of Baku, the center of the Russian petroleum fields, 10 oil tanks, each holding about 750,000 gallons, have been built, arranged like ours to deliver the oil directly into tank cars. Steamers probably bring the oil to Petrovsk, as they always have to the Volga; but it should be easy to lay a pipe line along the shore of the sea. Heretofore nearly the whole Russian supply has gone up the Volga and has been distributed thence by railroads and canals. The new line will probably compete severely with the river route, the navigation of which is interrupted in winter.

We are not accustomed to regard Russia as a wine producing country, but the wine traffic is important enough to cause the railroad statistician of the Treasury to make a special report on it. He finds that in 1892 the Russian railroads carried about 36,000,000 gallons of wine, produced in Bessarabia (along the Rumanian border), in the Crimea, and in the country on the slopes of the Caucasus, the southern side of which is like many vine-growing districts of western Europe.

The Tribunal of the Seine, in a suit in which a passenger sought to recover from the International Sleeping Car Co. for property stolen while occupying one of its cars, held that the sleeping-car company may not be regarded responsible like a hotel-keeper, though in certain respects it holds a similar relation to its patrons. It held that Article 1952 of the Code Civil, which declares the responsibility of the innkeeper, is a deviation from the ordinary rule of law, and must be interpreted strictly.

The great Turchino Tunnel on the new railroad line from Genoa, north through the Maritime Alps to Asti, in Piedmont, four miles long through hard rock, was opened through Oct. 31, just four years after work began. The contract required the tunnel to be finished in June, 1897; but it will be ready long before that. At first only hand drills were used, but since October, 1890, the power drills of Blanchard, of Vevey, have been employed, and with these the tunnel has advanced at the average rate of 9 ft. 6in., per day, against 2 ft. 5 in. with hand drills.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.

Published Every Friday.

At 73 Broadway, New York.

## EDITORIAL ANNOUNCEMENTS

**Contributions.**—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

**Advertisements.**—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

A statement has been published of westbound shipments of freight from New York over the trunk lines during the month of January, including everything going as far west as Buffalo, Salamanca and Pittsburgh, as follows:

| | 1894. | 1893. | Decrease. | Per cent. |
|---|---|---|---|---|
| Tons..... .... | 98,141 | 125,052 | 26,911 | 21.5 |

This is certainly a very serious falling-off, and there is probably no single branch of traffic which reflects more accurately the general business situation of the country. All the lines except the New York Central show a loss, and its gain of 348 tons (1½ per cent.) is to be considered in connection with the loss of 4,003 tons (28 per cent.) on its leased West Shore Railroad. The largest decrease in amount is 7,273 tons on the Erie, which carries a smaller proportion of high-class and a larger of low-class freight than its two principal competitors; but the Pennsylvania's loss of 6,891 tons is 32 per cent. of its last year's business, while the Erie's decrease is "only" 24 per cent. The Erie's two near neighbors, the Lackawanna and the Lehigh Valley, this year carried 8½ and 8 per cent. of the whole business, respectively, against the Erie's 23¾ per cent., which last was the largest share carried by any one railroad, the New York Central following close after with 22½ per cent. The New York Central and the West Shore together carried 36.6 per cent. of the whole business this year, against 31.8 per cent. last year.

Reports of New England railroads for the last quarter of 1893 indicate that traffic has fallen off less there than in some other parts of the country. The Boston & Albany Railroad reports for that quarter a decrease of only $209,295 (8 per cent.) in gross earnings, and the Fitchburg a decrease of $170,376 (8½ per cent.). In both cases the loss in receipts is more than made good by savings in expenses, the Fitchburg's net earnings having been $56,820 (9 per cent. and the Boston & Albany's no less than $183,353 (23 per cent.) more than in the last quarter of 1892. The latter gain is equal to 73 cents per share of the company's stock, and to make such a gain at such a time is enough to make the ordinary railroad manager, making frantic efforts to keep up dividends or out of receivers' hands, burst with envy. The figures which have general significance as to the New England business situation are the gross earnings. In the same quarter the New York Central had a decrease of $371,373 (3 per cent.), the Erie a decrease of $575,115 (7.3 per cent.), and the Pennsylvania one of $2,171,816 (12 per cent.).

The Pennsylvania Railroad in 1893 earned on its lines east of Pittsburg and Erie $2,466,621 (3.6 per cent.) less than the year before, and $1,051,620 (1½ per cent. ess than in 1891. The amounts are large, but the percentages are small, and if the losses had been distributed throughout the year, they would have little significance. There were, it is true, slight losses in January and February, much more than made good in March alone, and at the end of June there had been an *increase* in the gross earnings, for the half year amounting to $1,189,965 (3⅞ per cent.) and they were greater than in any previous year. Since June there has been a decrease every month, as follows:

| | July. | August. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|
| Decrease .. | $25 625 | $754,639 | $703.514 | $810,608 | $729,150 | $632,078 |
| Per cent... | 0.5 | 12.1 | 11.5 | 12.9 | 12.1 | 10.6 |

In view of the stimulation to passenger traffic during the Fair, which, however, was not a very important matter on these Eastern lines, it is gratifying to see that the loss was less in December than in any of the four months previous. For the entire half-year the earnings were:

| | 1893. | 1892. | Dec. | P. c |
|---|---|---|---|---|
| Gross earnings..... | $32,489,804 | $36,146,390 | $3,656,586 | 10 1 |

The gross earnings for the whole year were the smallest since 1890, and very little (¼ per cent.) less than then; but compared with the corresponding July-December half years, which best illustrates the recent and actual condition of things, we have a different showing, the gross earnings of these six months having been, for six years:

| 1888. | 1889. | 1890. | 1891. | 1892. | 1893. |
|---|---|---|---|---|---|
| $30,313,873 | $33,510,217 | $31,243,749 | $35,951,430 | $36,146,390 | $32,489,804 |

—less last year than before since 1888.

The contrast between these earnings and those of the New York Central at the same time is striking, and indicates what industries have been most depressed. The latter's decrease in gross earnings in the last half of 1893 was only $220,000, or less than one per cent., and in fact it made gains every month until November. Its decrease in December, however, was 7 per cent., against the Pennsylvania's 10 per cent. The New York Central had an increase of 11 per cent. in mileage, but all the new lines have light earnings. Of the two leading New England roads carrying trunk line traffic, and in a country where the industries are much more like those on the New York Central than those on the Pennsylvania, the Boston & Albany had a decrease of 6.4 per cent. and the Fitchburg one of 8.8 per cent. in the half year, but the greatest of these earned less in a half year than the Pennsylvania in a month. It is well known that the larger part of the decrease in earnings has been offset by a reduction of expenses; but we have noted these facts for the light they throw on the condition of business, and not at all to show the fortunes of the railroad companies in question.

### Compound Locomotive Tests on the Long Island Railroad.

It is some time since any indicative tests between compound and single expansion locomotives have been published, and for that reason probably the tests of the Baldwin (Vauclain type) of compound and single expansion locomotives on the Long Island Railroad, given in another column, will be received with more interest than was commonly felt in reports of tests some time ago when such tests were more frequent and, unfortunately, were not being made under comparable conditions. The tests on the Long Island were made under as nearly equal conditions for both engines as it seems possible to provide in practical service. The same train was hauled under practically the same conditions by both engines, and the tests were repeated three times. The results were duplicated as nearly on the different days as could reasonably be expected. This alone shows the accuracy of the tests, and is a point worthy of much emphasis in a consideration of the results. In the three tests of the simple engine the greatest variation from the average fuel consumed was 8 per cent., and with the compound, 4 per cent. No practical man would ask for a closer duplication of the results. It is this duplication that is now always sought for by careful experimenters and which is frequently assumed to be a very correct measure of the equality of conditions. In this case the engines being alike and the same train being used during all the tests, it is probable that the results obtained furnish as fair a measure of the relative economy of the two engines tested as can be expected when the steam pressure is higher for the compound than for the single expansion engine. As to the fairness of giving a higher pressure to the compound there is some dispute. Those who claim that the compound is entitled to a higher pressure base their opinion upon the fact that tests of single expansion stationary engines have shown that there is a loss when too high steam pressure is used for a single expansion engine, the maximum economy being found when the steam pressure is not much above 125 lbs., while it is well understood than a compound engine can use economically a much higher steam pressure than a single expansion engine. If the matter under consideration was the practical operation of a locomotive in tight places—say on heavy grades—instead of the relative economy, a different conclusion might be reached, as there can be no question that a higher steam pressure makes a locomotive more powerful and "smarter," and gives the boiler greater storage capacity. In considering the tests in question the difference in steam pressure should be borne in mind.

The results show that there was a saving of 37.2 per cent. in fuel and 17.2 per cent. in water, which points to the conclusion that has been reached before, viz.: that beside the saving of steam with a compound engine, there is a secondary saving in fuel arising from the less amount of coal burned per square foot of grate per hour. The saving of 17.2 per cent. of steam must certainly have caused a saving of the same per cent. in fuel, and there remains 20 per cent. saving in fuel resulting from the decreased rate of combustion. The consumption of coal per square foot of grate per hour of running time with the single expansion locomotive was about 116 lbs., and for the compound about 73 lbs., hence a decrease of 37 per cent. in the rate of combustion resulted in the saving of 20 per cent. of fuel, which is not hard to believe, although it is somewhat above what has been expected. The saving that will result from a decreased rate of combustion has been pointed out before.

The cost of the fuel used is not given in the report of these tests, but assuming the cost to be about $2.50 a ton, the saving per train-mile would be about four cents, and for locomotives making 150 miles a day the saving would be about $6 a day, which amounts to nearly $1,800 a year, or nearly twice the entire cost of all the repairs on the entire locomotive. This is further evidence that where a compound locomotive makes a substantial saving any additional cost of repairs resulting from the use of compound cylinders disappears in comparison.

An important fact in connection with the saving of a compound locomotive is that, where the saving is as much as in this case, there must be a decided decrease in the wear and tear of boilers, which, in districts where the water is bad, must decrease greatly the cost of boiler repairs. In some parts of this country it has been found that the temperature of the firebox resulting from the forced combustion has reached the upper limit, and where the feedwater is bad and here is a deposit of scale on the water side of the firebox sheet, the sheets near the fire become overheated and bulge between the staybolts. In such cases the advantage of the compound locomotive burning less fuel is apparent. In cases where the water is bad there is, therefore, a good and substantial reason for using compounds if they will save fuel even if the fuel is so low in price as to be but a small factor in operating expenses. It is not to be expected that a saving of 37 per cent. in fuel, or even 20 per cent., will not be accompanied by other and further incidental savings, not alone in repairs and wear and tear of locomotives, but also in the labor of enginemen, and in the increased hauling capacity of the locomotive on grades and in hard places.

These tests were well made and they are very creditable to those who made them. The results are highly complimentary to the Vauclain type of compound. It is to be regretted that the important subject of the comparative efficiency of compound locomotives has remained so long without adequate investigation in the shape of a series of extended tests with different types. Unfortunately the shop tests planned to be performed on the experimental locomotive at the Purdue University have been brought to a sudden termination by the sad loss of the laboratory by fire.

### The Altoona Air-Brake Tests.

There are those who look unfavorably upon the progressive action of the Master Car Builders' Association in the matter of careful and scientific investigation into the relative merits of different details of cars and engines, and who discourage the adoption of Association standards; but it is clear from the results of the tests of axles, wheels, brake beams and air-brakes that the objectors have not succeeded in stemming the tide of thorough, scientific investigation. The proof that the investigations thus far made are legitimate and useful and therefore warranted, is written in the results. Makers of axles, wheels and brakebeams have had to improve their products in order to meet the demands, and these new demands have been proved beyond all question to be reasonable and just. Wheels, axles and brakebeams are now made within the limits set by the Master Car Builders' Association and are

GENERAL RESULTS OF ALTOONA TESTS.

| Prescribed Test. | Crane. | Westinghouse 1st. | Westinghouse 2d. | New York. | Boyden No. 1. | Boyden No. 2 (slide). | Lansberg. |
|---|---|---|---|---|---|---|---|
| Emergency Application. Commencement on 50th car | failed | passed | passed | passed | passed | passed | failed |
| Emergency Application, time to 55 lbs. pressure at 50th car. 4-in. and 6-in. piston travel | failed | passed | passed | passed | passed | passed | passed |
| Emergency Application, time to 55 lbs. pressure at 50th car. 12-in. piston travel | failed | failed | failed | failed | failed | failed | failed |
| Effect of "cutting out" cars on emergency action | passed | passed | passed | passed | passed | passed | failed |
| Graduating test | passed | passed | passed | passed | passed | passed | passed |
| Sensitiveness of emergency valve | passed good | passed good | passed good | passed good | passed good | passed good | passed bad |
| Holding power on grades | | | | | | | |
| Number of brakes failed to release in 30 minutes. 50 in lot | 0 | 10 | 3 | 2 | 12 | 20 | 32 |
| Time of charging one auxiliary reservoir. (Should not be more than 60 seconds, nor less than 45 seconds) | 54 | 72 | 87.8 | 72 to 68 | 56 | 45.5 | 62.4 to 65 |

sold at reasonable prices. This is a practical and profitable result. Those railroad officers who have been lukewarm towards the railroad technical associations should see, from these results, that their proper attitude toward both the Master Mechanics' and the Master Car Builders' associations is to give them encouragement, even to the extent of making them semi-official or of combining both associations in one. The separation of the car building and the locomotive department on railroads, hitherto existing, has had little or no justification, and generally it has been detrimental as well as costly. The tendency now, as is shown by the practice on the largest roads, is to combine the two departments in one and place them under the supervision of the best executive officer and Mechanical Engineer that can be obtained.

The most recent example of the value of the investigations and scientific tests of the Master Car Builders' Association is found in the tests of the car coupler and the air-brake. The car coupler tests were given in the last Proceedings of the Master Car Builders' Association and in condensed form in the *Railroad Gazette* of June 23 last. A synopsis of the report of the air-brake tests made at Altoona was given last week, page 78. These tests were severe and were intended to bring out and emphasize weak points. That this was accomplished will be seen from the results, which in some cases show that the brakes tested were very far from being safe to use.

The tests were confined to experiments with the best triple valves, made in the best way, by the different manufacturers, each manufacturer having full and sufficient notice to prepare his triples to meet the requirements (and to this extent the tests were not representative of commercial apparatus). The fact that a triple in a shop test gives a good result only shows that it is possible that the same type may be useful in practical service if well made. The fact that a valve did not give good results in the shop tests, which are made under the best possible conditions, is sufficient to condemn the device for practical service. The utility, then, of the shop test of air-brakes is mainly confined to the weeding out of the poorer devices, and it remains for the six months' service test, which is contemplated by the M. C. B. committee, to show the real practical value of the different devices.

It is impossible to draw conclusions as to the relative merit of some of the devices tested, for the reason that the newer manufacturers have gained experience in the last year which has enabled them to make triples that in a shop test practically meet the requirements. If several triples meet the requirements they are within the limitations of the shop tests and a final comparison between them can only be made by an examination of the design or from results of service tests. But these are not the matters now being considered; the purpose of the present test is to differentiate the triples in such a way that those which are very bad or inadequate shall be pointed out, so that railroads may not be led into useless expenditures, and to exclude from the service tests the brakes which do not meet the requirements of the shop tests.

The Crane triple tested was of the type shown in the *Railroad Gazette* June 22 last, and is the one now being considered in the suit for infringement, which has been brought by the Westinghouse Air Brake Company. The emergency valve is operated by the air stored in a cavity provided in the body of the triple valve. The cavity is made large enough to contain the amount of air needed to operate the emergency valve upon a rapid reduction of the pressure in the train pipe. We made no comparison of the tests of the *service* application followed by an *emergency*, as such a test is not indicative of anything in particular.

The Westinghouse triple tested was of the standard type, the construction of which is well known. Tests were made of two sets of these triples, differing only in condition and not in design. The New York triple was of a type patented in 1893, which has not been put into service and has since been abandoned, for the reason, we understand, that it would probably fall within the recent injunction granted to the Westinghouse company. A new triple quite different in construction has been developed since the Altoona tests.

The Boyden No. 1 triple is the type that has been used in service, and is the one in which piston valves are used instead of slide valves. The piston pulls a large valve off its seat to admit air to the brake cylinder from the train pipe. This triple is the one that is being considered in the present suit that has been brought by the Westinghouse Air Brake Company. The Boyden No. 2 triple has a large slide valve operated by the triple valve piston, which is operated to admit both auxiliary reservoir air and train pipe air to the brake cylinder, and is what is known as the "integral" construction. The question of infringement of this valve has not yet been taken up.

The Lansberg triples have leather-packed pistons and are very uncertain in action. A large number of them were recently put on some stock cars in the West, and they were so unsafe that railroad companies refused to use them and they had to be removed, not on account of infringement, but because they were dangerous. Westinghouse brakes were substituted.

The general results of the tests are shown in the accompanying table. These results indicate that brake manufacturers have now learned, mostly from the Westinghouse experience, to make triple valves so carefully that they will meet the requirements of shop tests. What will be the result in the six months' service test remains to be seen.

## Erie Finances.

The plans for reorganizing the later obligations of the New York, Lake Erie & Western and the discussion concerning it have brought out several points of general interest. Railroads are commercial enterprises, built and run for a profit. The building and operating therefore have an intimate relation with the financing of the company: what affects the one concerns the other.

The plan in brief is that the second mortgage bondholders shall exchange their 6 per cent. bonds for a like amount of new 5 per cent. bonds, the latter to include a number of new properties and to be for a sum double the issue of the seconds. The second holders must also subscribe for enough of the new fives at 90 to pay off the floating debt, about $10,000,000. The mortgage provides that $1,000,000 may be expended each year for additions to property and $500,000 for new equipment, enough of the new bonds being held in the treasury to cover these capital expenditures for 10 years. In return for the loss of 1 per cent. in interest and for participating in a mortgage whose principal is doubled (though with more security) the seconds are given a mortgage whose legal rights are clear and which can be foreclosed on default. The old seconds are also practically assessed to pay off the floating debt, the bonds received being put at a little higher price than the market quotations. It is probably owing to this latter fact that opposition has sprung up, though cable advices from London report that British holders are all satisfied with the plan. Certain American houses wish better terms, and a conference has been arranged for.

The point on which the whole matter really hinges is the language in which the old mortgage is drawn up. There must be six defaults of interest before foreclosure proceedings can be begun. So far the second mortgage is like an income bond. Then the mortgage provides that interest shall be paid after deducting expenses for maintaining and *building* the railroad. What does that term mean? If it covers improvement to roadbed and track, the right to interest is far removed. In any case a bright lawyer by appealing from court to court could stave off foreclosure for a long time. Then, again, the mortgage allows for deductions for new equipment necessary for handling the traffic; the Erie has about $5,000,000 of equipment trust notes outstanding which it might claim should be deducted, if legal proceedings should be begun at the end of the three years. Practically, therefore, the company has the matter in its own hands. The concessions already made have evidently been agreed to because it was deemed good policy to do so.

The situation of the holders of the seconds is to be regretted for many reasons. New money must be had by a progressive railroad, or else everybody dependent directly or indirectly upon transportation will suffer to a greater or less extent. But this new money must be obtained from those who have it to lend. Hence anything which tends to discredit the security offered to investors tends directly to limit capital and thus to check work and purchases. It is important, therefore, for the continued well-being of railroads that their bonds should be as free from danger of loss as possible. But in the Erie case the causes are fifteen years old. When that company was reorganized in 1878 the stockholders were assessed heavily, though they have not received much benefit. The present second bonds were substituted for an older issue. There is good reason for believing that the terms of this second mortgage were purposely so drawn as to make them good so long as the road was prosperous, but of little real value if misfortune came; in short, to make them contingent, and not, strictly speaking, bonds at all. It was a grave error, both from a moral and a politic point of view, to put out and sell to innocent purchasers such stuff as this mortgage under the notion that the bonds are first-class securities. A number of recent occurrences, such as the Atchison receivership, have somewhat weakened confidence in American bonds both at home and abroad. This old Erie issue, for which the present management is not responsible, now that the true character of those alleged bonds is publicly known, will not help matters. Of course there are good American railroad bonds and good American companies, but all alike suffer from the neglect or mismanagement of the few. Railroads which hope to extend and improve their plants in the future must borrow money. Keeping more than faith with investors must be a cardinal feature if that hope is to be realized.

## Train Accidents in 1893.

We present herewith our usual annual table showing the summary of train accidents in the United States as published in our columns month by month during the year. These records have now been kept for 21 years, but the records of the first half of this period are now of rather remote interest, and we have therefore condensed that part of the table. The principal features of the statistics are apparent to every reader without explanation, but we will repeat the main qualifications for the benefit of those unacquainted with these records. The accidents are classified according to their causes, and the cause is generally reported as it is given in the newspaper accounts from which the news is taken; but special inquiry is made concerning those accidents which are of general interest, or have peculiar importance on account of their causes or attending circumstances. All those accidents, embraced in the records, which have caused deaths or injuries have been published in our monthly accounts, with date, locality and name of road.

The most reliable basis on which to make comparison is in the number of persons killed, especially the number of passengers killed, and the smaller double-column table gives these statistics by months. Many train accidents in which no one is killed are never heard of in print, and the number of persons reported as injured in accidents is likely to vary according to the differen views of different reporters as to how small an injury deserves to be counted; in consequence of these elements of uncertainty the figures, other than those showing the number of persons killed, are valuable chiefly for comparison.

The year 1893 has already become famous by its railroad accidents, and the number of passengers killed is, indeed, 53 per cent. larger than the number reported in the previous year; but at the same time it will be noted that the number is substantially the same as in 1891 and in 1890, while the number of employees killed is 13 per cent. smaller than in 1892 and 23 per cent. smaller than in 1891 or 1890. In comparing the present record with these earlier years it will be well to call to mind the principal accidents in each year. In 1890 the three worst cases were at Shoemakersville, Pa.; Quincy, Mass., and Oakland, Cal., killing 57 passengers; in 1891 the five worst cases, killing altogether 82 passengers, were Ravenna, O.; Statesville, N. C.; Hastings, N. Y., Montezuma, N. Y.; and Charleston, W. Va.

The record of 1893 was, for the first six months, better than the average, the three most notable cases during that time being those at Wann., Ill., in January; Lafayette, Ind., in May, and Parkville, in June. The accident in Wann was not unusual in itself, but some cars of oil were ignited by the collision and a large number of people were killed and injured by an explosion of oil *two hours after* the collision. In the Lafayette case there was a perplexing problem in connection with the management of the air-brakes, and at Parkville there was bad practice in signaling.

The unpleasant notoriety of the year 1893 arose from eight accidents occurring in the two months beginning

## TRAIN ACCIDENTS—THEIR NATURE AND CAUSES, FOR TWENTY ONE YEARS.

| | 1893. | 1892. | 1891. | 1890. | 1889 | 1888. | 1887. | 1886. | 1885. | 1884. | 1883. | 1878-82 † | 1873-7 ‡ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TRAIN-MILEAGE in the U. S., in millions of train-miles* | 895.0 | 864.9 | 831.2 | 793.9 | 722.0 | 688.8 | 644.0 | ..... | ..... | ..... | ..... | ..... | ..... |
| COLLISIONS: | | | | | | | | | | | | | |
| Rear | 435 | 485 | 555 | 495 | 379 | 404 | 362 | 338 | 316 | 288 | 413 | 275 | 155 |
| Butting | 223 | 251 | 284 | 324 | 260 | 311 | 309 | 127 | 120 | 138 | 177 | 121 | 96 |
| Crossing and miscellaneous | 318 | 326 | 298 | 223 | 110 | 89 | 29 | 36 | 28 | 27 | 39 | 21 | 43 |
| Total collisions | 996 | 1,062 | 1,137 | 1,041 | 749 | 804 | 700 | 501 | 464 | 445 | 630 | 417 | 295 |
| DERAILMENTS: | | | | | | | | | | | | | |
| Broken rail | 71 | 63 | 53 | 38 | 32 | 61 | 50 | 45 | 102 | 60 | 84 | 48 | 71 |
| Loose or spread rail | 57 | 53 | 68 | 44 | 28 | 42 | 31 | 51 | 65 | 68 | 88 | 34 | 31 |
| Broken bridge or trestle | 20 | 30 | 42 | 38 | 42 | 40 | 39 | 20 | 32 | 34 | 35 | 27 | 24 |
| Broken or defective switch | 41 | 26 | 38 | 33 | 10 | 29 | 23 | 7 | 13 | 9 | 12 | 3 | 9 |
| Broken or defective frog | 16 | 11 | 11 | 14 | 7 | 16 | 7 | 20 | 11 | 11 | 7 | 2 | 5 |
| Other defects of road | 9 | 8 | 2 | 2 | 1 | 1 | 2 | 1 | ..... | ..... | 1 | 2 | 3 |
| Total defects of road | 214 | 191 | 214 | 167 | 120 | 180 | 152 | 174 | 223 | 182 | 227 | 116 | 149 |
| Broken wheel | 48 | 46 | 39 | 37 | 28 | 48 | 22 | 37 | 41 | 22 | 40 | 28 | 22 |
| Broken axle | 88 | 56 | 66 | 59 | 48 | 44 | 45 | 62 | 48 | 30 | 60 | 36 | 32 |
| Broken truck | 31 | 28 | 38 | 23 | 20 | 27 | 8 | 14 | 18 | 12 | 24 | 11 | 10 |
| Failure of coupling or drawbar | 29 | 27 | 20 | 7 | 5 | 7 | 4 | 3 | 6 | 3 | 2 | 1 | 4 |
| Fall of brakebeam | 19 | 22 | 27 | 12 | 9 | 9 | 10 | 6 | 10 | ..... | ..... | ..... | 3 |
| Other defects of equipment | 20 | 26 | 25 | 18 | 10 | 13 | 6 | ..... | ..... | ..... | 3 | 3 | 4 |
| Total defects of equipment | 241 | 206 | 215 | 158 | 120 | 148 | 100 | 128 | 123 | 67 | 129 | 79 | 76 |
| Misplaced switch | 67 | 98 | 78 | 54 | 54 | 76 | 49 | 68 | 55 | 82 | 89 | 77 | 76 |
| Negligence of trackmen or bridgemen | 14 | 5 | 16 | 8 | 10 | 3 | 4 | 4 | 4 | 2 | 9 | 5 | 9 |
| Runaway engine or train | 4 | 1 | 9 | 10 | 8 | 14 | 6 | 2 | ..... | 3 | 1 | 2 | 2 |
| Open draw | 4 | 3 | 3 | 3 | 1 | 4 | 3 | 2 | 5 | 5 | 4 | 3 | 4 |
| Other negligence | 48 | 37 | 38 | 22 | 19 | 26 | 12 | ..... | ..... | 2 | 0 | 4 | 6 |
| Total negligence in operating | 137 | 104 | 144 | 108 | 92 | 117 | 74 | 76 | 64 | 91 | 112 | 91 | 97 |
| Animals on track | 50 | 51 | 61 | 76 | 41 | 57 | 32 | 36 | 25 | 28 | 45 | 39 | 48 |
| Snow or ice | 16 | 7 | 6 | 6 | 5 | 22 | 6 | 27 | 30 | 7 | 13 | 13 | 20 |
| Washout | 16 | 19 | 19 | 18 | 20 | 19 | 11 | 23 | 22 | 25 | 25 | 21 | 28 |
| Landslide | 27 | 30 | 28 | 28 | 24 | 34 | 10 | 21 | 7 | 18 | 16 | 6 | 6 |
| Accidental obstruction | 32 | 29 | 20 | 28 | 8 | 20 | 31 | 17 | 17 | 40 | 43 | 32 | 38 |
| Malicious obstruction | 35 | 28 | 42 | 26 | 20 | 11 | 12 | 15 | 13 | 12 | 12 | 13 | 15 |
| Switch or rail purposely misplaced | 16 | 7 | 11 | 19 | 5 | 22 | 12 | 21 | 13 | 17 | 16 | ..... | 2 |
| Other unforeseen obstructions | 5 | 8 | 5 | 13 | 8 | 5 | 9 | 4 | 6 | 3 | 19 | 3 | ..... |
| Total unforeseen obstructions | 197 | 179 | 192 | 194 | 131 | 193 | 129 | 167 | 135 | 152 | 199 | 128 | 158 |
| Others | ..... | ..... | ..... | ..... | ..... | ..... | 7 | ..... | ..... | ..... | ..... | 1 | 5 |
| Unexplained | 433 | 425 | 439 | 377 | 296 | 385 | 243 | 102 | 138 | 186 | 259 | 231 | 223 |
| Total derailments | 1,212 | 1,165 | 1,204 | 1,004 | 759 | 1,032 | 705 | 641 | 681 | 681 | 926 | 646 | 709 |
| ACCIDENTS WITHOUT COLLISION OR DERAILMENT: | | | | | | | | | | | | | |
| Boiler explosions | 24 | 19 | 19 | 21 | 13 | 15 | 14 | 19 | 11 | 16 | 13 | 14 | 10 |
| Cylinder explosions | 4 | 5 | 12 | 6 | 3 | 7 | 2 | 2 | ..... | 2 | 5 | 1 | 3 |
| Broken parallel or connecting rod | 8 | 10 | 8 | 9 | 5 | 22 | 17 | 22 | 28 | 17 | 26 | 14 | 10 |
| Cars burned while running | 18 | 13 | 19 | 15 | 4 | 7 | 8 | 8 | 9 | 13 | 13 | 8 | 9 |
| Various breakages of rolling stock | 14 | 15 | 16 | 21 | 18 | 15 | 33 | 6 | 17 | 13 | 23 | 8 | 13 |
| Other causes | 31 | 38 | 29 | 29 | 18 | 33 | 12 | 12 | 7 | 4 | 4 | 1 | 6 |
| Total without collision or derailment | 99 | 100 | 103 | 101 | 61 | 99 | 86 | 69 | 72 | 65 | 81 | 46 | 51 |

### RECAPITULATION.

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Collisions | 996 | 1,062 | 1,137 | 1,041 | 749 | 804 | 700 | 501 | 464 | 445 | 630 | 417 | 295 |
| Derailments | 1,212 | 1,165 | 1 204 | 1,004 | 759 | 1,032 | 705 | 641 | 681 | 681 | 926 | 646 | 709 |
| Other accidents | 99 | 100 | 103 | 101 | 61 | 93 | 86 | 69 | 72 | 65 | 81 | 46 | 61 |
| Total | 2,307 | 2,327 | 2,444 | 2,146 | 1,569 | 1,935 | 1,491 | 1,211 | 1,217 | 1,191 | 1,640 | 1,109 | 1,067 |

* Train-mileage is taken from Poor's Manual, which gives *revenue* mileage only; that for 1893 is estimated.
† Average per year, for five years, 1878 to 1882, inclusive.
‡ Average per year, for five years, 1873 to 1877, inclusive.

## CASUALTIES TO PASSENGERS AND EMPLOYEES IN TRAIN ACCIDENTS IN 1893.

*Tabulated According to Classes of Causes.*

| Month. | Defects of road. | | Defects of Equipment. | | Negligence in operating. | | Unforeseen obstructions and maliciousness. | | Unexplained. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pass. | | Emp. | | Pass. | | Emp. | | Pass. | | Emp. | | Pass. | | Emp. | |
| | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. |
| January | 3 | 58 | 9 | 32 | 0 | 4 | 3 | 4 | 6 | 75 | 18 | 89 | 0 | 0 | 7 | 26 | 2 | 18 | 1 | 19 | 11 | 155 | 38 | 170 |
| February | 2 | 71 | 1 | 28 | 0 | 17 | 1 | 6 | 9 | 47 | 32 | 67 | 0 | 15 | 5 | 10 | 1 | 22 | 6 | 16 | 12 | 172 | 45 | 127 |
| March | 0 | 52 | 3 | 12 | 0 | 3 | 10 | 8 | 3 | 43 | 18 | 42 | 0 | 3 | 2 | 5 | 1 | 12 | 3 | 4 | 4 | 113 | 36 | 71 |
| April | 1 | 6 | 2 | 7 | 0 | 0 | 9 | 6 | 1 | 9 | 46 | 60 | 1 | 7 | 3 | 14 | 0 | 1 | 3 | 6 | 2 | 23 | 33 | 93 |
| May | 1 | 10 | 4 | 6 | 3 | 22 | 5 | 5 | 2 | 20 | 17 | 45 | 0 | 6 | 9 | 12 | 0 | 9 | 4 | 26 | 6 | 67 | 39 | 91 |
| June | 0 | 26 | 2 | 11 | 0 | 0 | 0 | 2 | 7 | 42 | 15 | 63 | 0 | 0 | 7 | 14 | 0 | 13 | 1 | 14 | 7 | 81 | 25 | 104 |
| July | 0 | 3 | 2 | 3 | 0 | 7 | 2 | 6 | 10 | 54 | 23 | 62 | 0 | 1 | 6 | 6 | 0 | 21 | 3 | 2 | 10 | 86 | 36 | 79 |
| August | 5 | 4 | 1 | 4 | 0 | 0 | 3 | 2 | 25 | 70 | 12 | 43 | 0 | 2 | 3 | 8 | 0 | 13 | 9 | 10 | 30 | 89 | 28 | 67 |
| September | 0 | 0 | 0 | 4 | 0 | 0 | 3 | 7 | 32 | 85 | 27 | 62 | 0 | 0 | 0 | 22 | 3 | 3 | 2 | 6 | 35 | 88 | 32 | 101 |
| October | 0 | 37 | 4 | 4 | 0 | 3 | 3 | 14 | 42 | 94 | 30 | 99 | 0 | 0 | 6 | 15 | 0 | 33 | 2 | 8 | 42 | 166 | 45 | 140 |
| November | 1 | 25 | 2 | 6 | 0 | 8 | 5 | 10 | 13 | 47 | 22 | 56 | 0 | 4 | 6 | 19 | 0 | 0 | 8 | 17 | 14 | 84 | 43 | 108 |
| December | 3 | 44 | 2 | 4 | 0 | 0 | 3 | 5 | 2 | 49 | 13 | 54 | 0 | 18 | 2 | 16 | 0 | 5 | 4 | 10 | 5 | 116 | 24 | 89 |
| Year | 15 | 336 | 32 | 121 | 3 | 64 | 47 | 75 | 152 | 634 | 243 | 742 | 1 | 56 | 56 | 167 | 7 | 150 | 46 | 138 | 178 | 1,240 | 424 | 1,243 |
| Year 1892 | 23 | 322 | 39 | 103 | 2 | 85 | 61 | 93 | 78 | 514 | 271 | 718 | 5 | 88 | 72 | 177 | 8 | 117 | 47 | 113 | 116 | 1,123 | 490 | 1,204 |
| Year 1891 | 24 | 291 | 45 | 101 | 7 | 90 | 42 | 65 | 114 | 458 | 345 | 939 | 23 | 116 | 57 | 154 | 9 | 228 | 81 | 188 | 177 | 1,183 | 550 | 1,447 |
| Year 1890 | 19 | 195 | 61 | 126 | 4 | 86 | 30 | 77 | 115 | 624 | 337 | 959 | 24 | 103 | 60 | 165 | 10 | 216 | 81 | 192 | 172 | 1,224 | 569 | 1,519 |
| Year 1889 | 16 | 167 | 30 | 81 | 7 | 58 | 24 | 63 | 46 | 291 | 189 | 595 | 34 | 107 | 53 | 120 | 5 | 122 | 40 | 119 | 108 | 745 | 336 | 978 |
| Year 1888 | 5 | 195 | 45 | 153 | 16 | 65 | 35 | 92 | 92 | 388 | 217 | 573 | 11 | 106 | 77 | 163 | 44 | 258 | 60 | 117 | 168 | 1,012 | 434 | 1,098 |

Aug. 26, and five of these were directly or indirectly caused by the rush of business due to the World's Fair. These eight accidents caused the death of 110 passengers. As they are fresh in the memory of most of our readers we simply note their names: In August, Dykemans, Long Island City and Chester; in September, Colehour, Manteno and Kingsbury; in October, Jackson and Nichols. The remaining accident of the year to be classed with these was the rear collision at Chicago in November, killing 12 passengers.

It will be observed that the total number of accidents has not varied appreciably during the last three years, although the train mileage has increased during that time. The distribution according to causes is also sufficiently unchanged to demand no comment except in two or three cases. The derailments due to the failure of a coupling or drawbar have been much larger during the last three years than ever before and have gradually increased during these three years. The derailments of cars in freight trains by the quick application of air brakes have probably been worse than in 1892, though the tota number reported is still small. We find only three during the year.

Following is the classification of the casualties of 1893 according to the class of accidents in which they occurred, the records for the previous six years being shown for comparison.

| *Killed.* | Employees. | Passengers. | Other persons. | Total. |
|---|---|---|---|---|
| In collisions | 215 | 127 | 39 | 381 |
| In derailments | 164 | 50 | 48 | 262 |
| In other accidents | 45 | 1 | 2 | 48 |
| Total | 424 | 178 | 89 | 691 |
| Total 1892 | 490 | 116 | 66 | 672 |
| Total 1891 | 550 | 177 | 63 | 790 |
| Total 1890 | 569 | 172 | 65 | 806 |
| Total 1889 | 336 | 108 | 48 | 492 |
| Total 1888 | 434 | 168 | 65 | 667 |
| Total 1887 | 406 | 207 | 43 | 656 |

| *Injured.* | Employees. | Passengers. | Other persons. | Total. |
|---|---|---|---|---|
| In collisions | 682 | 517 | 43 | 1,242 |
| In derailments | 520 | 705 | 54 | 1,279 |
| In other accidents | 41 | 18 | 4 | 63 |
| Total | 1,243 | 1,240 | 101 | 2,584 |
| Total 1892 | 1,205 | 1,128 | 74 | 2,407 |
| Total 1891 | 1,447 | 1,183 | 55 | 2,685 |
| Total 1890 | 1,519 | 1,224 | 69 | 2,812 |
| Total 1889 | 978 | 745 | 49 | 1,772 |
| Total 1888 | 1,098 | 1 012 | 94 | 2,204 |
| Total 1887 | 890 | 916 | 140 | 1,946 |

The number of persons killed and injured in train accidents during the past 12 years, as tabulated in our accounts, was as follows:

| | Killed. | Injured. | Train mileage, millions.* | No. persons killed per million train miles. |
|---|---|---|---|---|
| 1893 | 691 | 2,584 | ..... | ..... |
| 1892 | 672 | 2,407 | 864.9 | 0.777 |
| 1891 | 790 | 2,685 | 831.2 | 0.950 |
| 1890 | 806 | 2,812 | 793.9 | 1.015 |
| 1889 | 492 | 1,772 | 622 0 | 0.690 |
| 1888 | 667 | 2,204 | 688.8 | 0.968 |
| 1887 | 656 | 1,946 | 644.0 | 1.018 |
| 1886 | 416 | 1,409 | 569.6 | 0.730 |
| 1885 | 307 | 1,530 | 560.2 | 0.548 |
| 1884 | 389 | 1,760 | 541.3 | 0.718 |
| 1883 | 473 | 1,910 | 538.0 | 0.879 |
| 1882 | 380 | 1,588 | 476.0 | 0 798 |

*Train mileage is taken from Poor's Manual; which gives revenue mileage only.

The more prominent causes of collision for five years past are shown in the following table:

| | 1893. | 1892. | 1891. | 1890. | 1889. |
|---|---|---|---|---|---|
| Train breaking in two | 118 | 101 | 96 | 65 | 82 |
| Misplaced switch | 80 | 90 | 78 | 90 | 59 |
| Failure to give or to observe signals | 108 | 140 | 153 | 82 | 58 |
| Mistake in giving orders or understanding orders | 67 | 78 | 88 | 73 | 46 |
| Miscellaneous | 240 | 201 | 259 | 243 | 150 |
| Total explained | 613 | 610 | 674 | 553 | 395 |
| Unexplained | 383 | 452 | 463 | 488 | 354 |
| Total | 996 | 1,062 | 1,137 | 1,041 | 749 |

As in 1892, we have kept some track of accidents on street car lines, especially where trains or engines of standard railroads have been involved, and of other accidents which are loosely classed as railroad accidents. Of these in 1893, the most notable were the killing of seven persons by a runaway train on a quarry railroad at Somerset, Pa., in April, and of nine persons in a sleigh which was struck by a locomotive near Lonsdale, R. I., in January. We have noted in our monthly record, 21 derailments of street cars killing 17 persons, and 24 collisions between street cars and trains of standard railroads. Most of the street car accidents were on lines operated by electric power or cable. Besides the case at Lonsdale, we have noted four instances where five persons were killed on a grade crossing at once.

## Shippers' Objections to the Official Freight Classification.

The objections made by Western shippers to the new official classification, which were widely published a week or two since, are by no means quieted. The most prominent objection, as given in the press dispatches, is that against the non-negotiable feature of the uniform bill of lading, but inasmuch as the insertion of the words "not negotiable" in the bill of lading has been optional with the roads, under authority of circulars issued by the joint committee in 1890, and reaffirmed by Supplement No. 2, since the present classification (No. 12) was issued, this objection loses most of its present force; but there are other complaints which will make more trouble,

The new rules to which the Chicago shippers are objecting so strongly are as follows:

Rule 1. Unless otherwise provided in this classification, property will be carried at the reduced class rates specified herein if shipped subject to the conditions of the uniform bill of lading. If shipper elects not to accept the said reduced class rates and conditions he should so notify the agent of the receiving carrier at the time his property is offered for shipment; and if he does not give such notice it will be understood that he desires his property carried subject to uniform bill of lading conditions in order to secure the reduced rate thereon. Property carried not subject to the conditions of the uniform bill of lading will be at the carrier's liability, limited only as provided by common law and by the laws of the United States and of the several states, in so far as they apply. *Property thus carried will be charged one class higher than if shipped subject to the conditions of the uniform bill of lading, and the cost of Marine Insurance will be added over any part of the route that may be by water.* (Italics ours.)

Rule 2. When the classification of an article is given "Released," the shipper or owner *will be required to* execute a uniform release, as per forms shown on pages 9, 10 and 11 (in addition to accepting the conditions of the uniform bill of lading) for all property so classified to secure reduced rates. If shipper refuses to execute a uniform release (on forms as shown on pages 9, 10 and 11) the property will be charged two classes higher and cost of marine insurance, and will be forwarded at the carrier's liability, limited only as provided by common law and by the laws of the United States and of the several states, in so far as they apply.

Rule 3. Where the classification provides for a reduced rate based on a certain fixed valuation (in addition to the acceptance of the conditions of the uniform bill of lading), such valuation must be plainly written in full on shipping order and receipt by shipper, and on the bill of lading and way bill or manifest by agent. In the absence of such notation on shipping order and receipt *made by shipper*, the property will be taken at the carrier's liability, limited only as provided by common law and by the laws of the United States, and of the several states, in so far as they apply, and will be charged one class higher and cost of marine insurance.

The Chicago Freight Bureau has adopted resolutions characterizing the classification, as now revised, as a "gross attempt to encroach upon the shippers' rights;" protesting against the enforcement of the rules, and instructing the officers of the Bureau to complain to the Interstate Commerce Commission. Similar resolutions have been adopted by the executive committee of the National Transportation Association, the Milwaukee Board of Trade, the Cincinnati Freight Bureau and the Toledo Produce Exchange. The Board of Trade has also passed recommendations for the strengthening of the present law in the interest of shippers and the compulsion by law of a common-law bill of lading before Jan. 1, 1896.

At first the newspaper attacks had the appearance of

a personal affair directed against Chairman Blanchard, of the Central Traffic Association, but there is no doubt that the feeling among shippers is now quite general and based on intelligent views. And we are bound to say that this feeling has strong justification. While it is right that the railroads should favor (by lower rates) those shippers who will adopt the most convenient bill of lading, there is no question that the favor prescribed by the above-quoted rules is unreasonably large. The difference between the rate offered to the shipper who demands his common-law rights and the one who accepts the railroad's conditions is somewhere from 10 to 10,000 times as great as the actual average difference in cost to the railroad. Moreover, it is hard to see the expediency of making such a change at present, even if it were just.

### Some World's Fair Traffic Experiences.

The Atchison, Topeka & Santa Fe Railroad Co. has favored us with a statement of its passenger traffic during the World's Fair, which gives not only the passenger earnings during each of the six months from May to October inclusive, but the number and mileage of passengers and the average distance traveled, fare paid and rate per mile. This is interesting not only on account of the World's Fair, but also because of a quite phenomenal experiment in excursion travel made (in consequence of a quarrel, we believe) by the railroads to Denver in August, 1892. The occasion was the "conclave" of Knights Templar held in Denver at that time. The average citizen would not suppose that quite all the world is interested in a meeting of Knights Templar; but if he had been in Colorado at the time he would have thought so. An absurd rate of $12 for the round trip was made between Chicago and Denver (1,210 miles by the Atchison); and all the West and a large part of the rest of the country took advantage of it to visit Colorado, Utah, etc. The result on the Atchison was in August, 1892, an amount of travel nearly one fourth greater than last August, with the World's Fair in full bloom. The excursion fares were so low, however, that the earnings were but 9 per cent. more than the next year. The travel in 1892 was nearly one-third more in August than in July, and the average journey rose from 66 to 96 miles, while the average fare fell from 2.202 cents per mile in July to 1.754 cents in August; and it must be remembered that the Atchison is an immense system of nearly 8,000 miles, on which the aggregate of the ordinary travel amounts to very large figures. The gain in passenger-movement from July to August was 12,897,000 passenger-miles.

The return travel after the Denver conclave was largely in September; but both in September and October the travel on the Atchison system was much greater in 1893 than the year before; 20 per cent. greater in September, and 64 per cent. greater in October. The average rates in August and September were much lower in 1892 than last year; but for the whole six months of the Fair the average was 1.996 cents per mile in 1893 against 2.044 the year before.

For the six months the figures for the two years are:

| | 1893. | 1892. | Increase. | |
|---|---|---|---|---|
| No. passengers ..... | 1,747,696 | 1,723,850 | 23,816 | 1.4 |
| Passenger miles..... | 177,411,895 | 141,370,111 | 36,041,784 | 25.5 |
| Passenger earnings..... | $3,540,281 | $2,889,364 | $651,917 | 22.5 |
| Average journey..... | 101 51 | 82,01 | 19 50 | 25.0 |
| Average fare per pass.... | $2.03 | $1.68 | $0.35 | 20 8 |
| Average rate per mile.. | 1.997c. | 2.044c.(dec) | 0.048c | 2.3 |

The noticeable fact here is the very small increase in the *number* of passengers—only 1.4 per cent. The great gain in movement and earnings was almost wholly due to the longer average journeys. Doubtless but for the Fair, travel would have been much lighter than the year before, stimulated as it was then by the low conclave rates; but doubtless, also, the Fair travel reduced considerably the other travel. Other pleasure travel last summer was given up by a great many that they might spare time and money for the World's Fair; not on the Atchison only, but everywhere.

The Michigan Central is another road whose experience with World's Fair traffic was striking. It gives its whole passenger business for the six months of the Fair as follows:

| | 1893. | 1892. | Inc. or Dec. | P.c. |
|---|---|---|---|---|
| No. passengers..... | 1,938,900 | 1,978,770 | Dec. 39.870 | 2.0 |
| Passenger-miles | 208,101,911 | 120,205,523 | Inc. 88,196.388 | 73.5 |
| Passenger earnings. | $4,246,516 | $2,525,298 | Inc. $1,721,218 | 68.1 |
| Av. journey, miles. | 107 | 61 | Inc. 46 | 75.4 |
| Av. fare per pass .. | $2.19 | $1.28 | Inc. $0.81 | 63.3 |
| Av. rate per mile.. | 2.038c. | 2.101c. | Dec. 0.063c. | 3.0 |

Here we see that practically fewer persons traveled on the Michigan Central during the Fair than during the corresponding months of the previous year, but so many of them were making a long journey to Chicago that the passenger-mileage was nearly three-fourths greater than the year before, and the rates were kept up so well that the earnings increased more than two thirds.

Although we have criticised the American Society of Mechanical Engineers for neglecting railroad work, we are bound to protest that some of our contemporaries have drawn upon their imaginations to an unwarrantable degree in this matter. The fact that the Scciety saw fit to refuse to supervise shop tests at the Purdue University and has been so busy in other branches of engineering as to omit an adequate consideration of railroad mechanical engineering, does not necessarily condemn that society *in toto* nor justify the sweeping generalizations of our contemporaries. The managers may have deemed themselves strongly justified in refusing to supervise the tests in question. This is a free country and the society is not bound to do what its managers think is not for its best good. In the engineering branches where the Society has been active, it has produced papers and discussions of the highest value. What has *not* been done is another matter. One contemporary says: "Railroad men are generally practical, if anything, and there is often such an overwhelming amount of theory and mathematics to be digested at each meeting that they find little interest in the proceedings." This statement is not only unjust, but senseless. Railroad men, members of the Society, are outspoken in their praise of the *Proceedings*. They are educated as well as practical men, and the mathematics given in the *Proceedings*—not a large amount—are readily understood by them. The best that can be said about this statement is that it is the result of ignorance of the work of the Society. Our contemporary thinks that the Society ought "to make an endeavor to get more papers that pertain to the every-day affairs of mechanical engineering," and criticises the personnel of the writers of the papers at the December meeting, complaining that, "six were by professors, in most cases giving the results of school tests, and five others were of a mathematical or theoretical order, or gave descriptions of testing methods or of engineering instruments." What is an engineering society for if not to give the results of tests? And where can be found the men and apparatus better adapted to make accurate, scientific and useful tests than the professors in our technical schools, with their complete outfits, assisted by intelligent students? Of all the useful work which an engineering society does, perhaps that portion which is devoted to the explanation of "testing methods" and "engineering instruments" is the most quickly utilized by its members and the most productive of practical good for engineers. Even though a considerable percentage of mathematical and theoretical papers were presented, it still remains for the critics to show that they have not a practical value. Those who cannot read mathematical or theoretical papers understandingly will find such papers of little value to them, but the great body of engineers are good mathematicians, and probably the best and quickest way to get a practical grasp of a new subject is to encourage our professors in technical schools, to whom we owe more than most of us are willing to acknowledge, to go before us and dig out the true inwardness of things and smooth the pathway for those who are to follow on with the practical application to commercial uses. Every engineer will acknowledge his indebtedness to the mathematical and theoretical work done by others and which he has put into practical use, and it is to be hoped that the papers by college professors, whether giving "school tests" or those of a "mathematical or theoretical order" will increase rather than diminish. The hope for the usefulness of any engineering society lies in the encouragement of that class of work as much as of any other.

A recent decision and opinion rendered by Judge Lacombe, of the United States Circuit Court at New York, in denying a petition of a stockholder to inspect the books of the Nicaragua Canal Construction Company, contains some sound advice for receivers of large corporations, and some of it is peculiarly pertinent to the railroad receiverships of the past year. In fact a good part of the judge's dictum is so clearly applicable to recent cases that he might well be suspected of having in mind some other cases than the one he was to decide. Among other things made clear was the fact that the court was not a repair shop for shipwrecked concerns, but only a harbor of refuge. The decision says:

"It is not the duty of a receiver to formulate, or to promote, one or another proposed plan of reorganization. Whether there shall be a new organization formed of stockholders, bondholders or creditors, with what respective interests and upon what terms, is one that should be left for the determination of the persons interested without interference in any way by the Court or its officers. The Court will hold the property of the coporation safe from outside attacks, and in proper cases will keep its business going on so that whatever value there may be in the business as a business may be preserved for all concerned; but it will not undertake either itself or by its officer (the receiver) to reorganize the old corporation, or to create a new one, or to solicit subscribers to some syndicate of prospective purchasers. It is the receiver's duty, to stand absolutely neutral between all, giving to no one any preference or advantage over the other, and according equal facilities to every stockholder, whether he holds a single share or ten thousand."

This is salutary advice and the kind that other courts should administer to receivers who are ostensibly appointed in the interest of certain factions. It has particular bearing upon the recent controversy over the New England Receivership. In refusing the petition of the shareholder to inspect the company's books the court does not deny the propriety and privilege of a bonafide stockholder to examine the books of a bankrupt corporation, which are in the custody of the court, to enable him to determine whether or not a certain plan of reorganization is a desirable one for himself and other stockholders to enter into. Such an examination should be accorded under proper regulations as to time and circumstances so as not to interfere either with the transaction of the receiver's duties or with such inspection as his fellow members may be entitled to.

It appears that the reduction in the pay of employees on the Union Pacific, which the Receivers of that road have ordered, does not go into effect until March 1. The more detailed reports of the order issued by Judge Dundy, of the United States Court, in approving the action of the Receivers, indicate that he holds views on the subject of strikes quite as vigorous as those of Judge Jenkins, who issued the injunction at Milwaukee forbidding the Northern Pacific employees to strike. Judge Dundy's order as reported in the Chicago *Inter-Ocean* contains the following paragraph:

It is further held that any employee who does not wish to continue his employment under these conditions may terminate it at any time and in any manner he sees fit, so as not to obstruct business; and that it is unlawful for any employees to conspire, combine or confederate together while in the service of the Receivers, or with, by or through any labor or other organization, or the officers or committees thereof, or with other person or persons whomsoever, for the purpose or with the intention of inducing a strike upon any of the railway and telegraph lines operated by the said Receivers under the direction of this court, or to do any other thing, either individually or collectively, for the purpose of hindering, impeding, delaying, obstructing, embarrassing or injuring the Receivers in and about the conduct of the business.

The employees are then ordered to refrain from combining . . . for the purpose of inducing or causing a strike, by any of the employees, acting collectively or by concerted action, and from . . . encouraging or advising others to quit the service of the Receivers. The Receivers in their petition set forth that the earnings of the road for the first 11 months of 1893 were $6,614,075 less than for the same time in 1892, and the net earnings $4,328,384 less. All employees in every department are affected by the reduction, and it is said to amount to about 10 per cent., though the percentage varies a good deal in different departments. The reductions seem to have been made with great care and discrimination. The Receivers state that the wages of engineers and firemen are still higher than on any one of 27 neighboring roads named, except the Missouri, Kansas & Texas and the Great Northern. The average reduction of telegraph operators' pay is 5.4 per cent., and the minimum pay in this department will be $45 a month in Nebraska and Kansas. Further west the minimum is higher.

The Prussian Ministry of Public Works began with this year the publication of a new monthly journal entitled *Zeitschrift fur Kleinbahnen*, which we are tempted to call the *Little Railroad Gazette*, the littleness attaching not to the *Gazette*, but to the *Railroad*—that is, it is devoted to what we might call purely local railroads, when built light, or otherwise not built under the general regulations governing the construction of the general railroad system, the lines of which must permit a general circulation of rolling stock. Our lines of this kind shade off imperceptibly into the full-grown railroad, so that it is impossible to draw a sharp line of division between them; but in Germany the ordinary or "full" railroads have to conform to a certain standard of construction established by law, to secure a certain degree of uniformity regarded as indispensable in case of war, which all European countries have always to prepare for. In Germany, as also in several of the principal countries of Europe, it is believed that the system of heavy railroads is substantially completed, but that there is a great field yet for the construction of light and cheap local lines. Not much has been done yet in this direction in Germany, and, curiously, Italy takes the lead, its very poverty compelling it in many situations to build cheap lines or none. The new journal, we may be sure, will have full and accurate intelligence from all parts of the world, for nowhere is there a greater storehouse of railroad information, and nowhere are efforts more persistent to add to it than in the Prussian Ministry of Public Works. The very first number of the *Zeitschrift* has an article on the "Development of Light Railroads in the United States," by Dr. Kollman, a member of the State Railroad Directory at Frankfort-on-Main.

The Lehigh Valley is now running dining cars on its through trains between New York and Buffalo, and the management has followed a fashion lately set by two or three Western roads, in furnishing meals by the card, instead of at the uniform $1 rate. The bill of fare indicates that a full regular meal would cost more than a dollar, but persons who wish to take a light meal or a simple luncheon can do so for from 30 to 60 cents. For example, a sandwich with boiled eggs and tea or coffee would be 55 cents, or stewed oysters 40 cents. We understand that the plan has shown good results thus far. Probably the passenger who wants a sandwich and a cup of coffee for 10 cents and a whole dinner for a quarter will be no better off than under the old plan, but it is no more than fair for him to remember that dining cars are operated at a loss, even when there is good patronage. There may be a field, however, on some through trains, for the "eating bar" or "counter lunch," such as was maintained on the Philadelphia, Wilmington & Baltimore in 1863. The extensive use of second-class sleeping cars west of Chicago indicates that there are many people who desire to sleep on a frugal but profitable scale, and that a railroad may, to advantage, favor such persons in the matter of meals as

well as in lodging. On a long journey these passengers would pay something to get rid of the lunch basket, which is now their only resource.

Engineman Woolley, who was in charge of the engine, of the eastbound train in the collision at Nichols, Mich., Oct. 20, was set free, the same as the conductor, the Prosecuting Attorney deciding, according to the reports, that as the conductor had already been let off, and as the engineman's guilt would be *harder to prove* than the conductor's, he would abandon the case. This is somewhat surprising. We should think it would be easier, for the engineman disregarded a plain rule. He did not deny receiving the order at Battle Creek to wait for train No. 9 (after he should have proceeded about one mile), but he claims to have accepted the conductor's word for it that No. 9 had already passed. (Both men had just come on duty.) In this he clearly disregarded the rule to *examine the register*, instead of taking any one's word for it; while the conductor's offense was that of not pulling the bell-rope or brake-cord so as to stop the train at Nichols when the engineman failed to shut off steam in time. The conductor's ability to do this at the right moment and the degree of his negligence in not doing it are debatable questions, while the engineman's negligence is clear. The fireman supported the engineman's claim, but the conductor brought circumstantial evidence to corroborate his statement that he did not tell Woolley that No. 9 had passed.

The iron and steel market remains practically unchanged. Prices are lower than they have ever been before. Producers and dealers try to make themselves believe that the tendency is better. This feeling is not due to buying and selling, but to the belief that matters cannot be worse. There is a little more demand for pig iron from foundries, and many inquiries. The stock of iron and steel carried by consumers is doubtless small, and they are watching the market closely. The situation at Chicago is more encouraging. One railroad is said to have ordered some thousands of tons of track materials exclusive of steel rails, to be delivered between Chicago and St. Louis; and good business is reported in steel billets, skelp and wire rods. Steel billets have sold at Pittsburgh for $15, Bessemer pig at $10.50, wire nails in large lots at 90c. a keg. Large sales of nails are reported, and prices are advancing. Gray forge pig is quoted at $9.50 and No. 1 foundry at $12. Pittsburgh sellers have been beaten in several instances lately. Cleveland is given the credit of having taken a large order for Bessemer pig at $10 delivered. The efforts of Congressman Johnson to reduce the duty on steel rails to 5, 10 or 15 per cent. instead of 25 per cent. failed in the House, the amendments offered being voted down successively.

Last week we noted the destruction of the Engineering Laboratory at Purdue University, Lafayette, Ind. We have since received a circular signed by the President and Professor Goss, setting forth the great loss the fire has occasioned to the University and emphasizing the necessity for a speedy restoration of the buildings and apparatus. This should appeal to every railroad officer in the country in grateful acknowledgment of the services rendered by the university and especially of the Director of the Engineering Laboratory in the interests of railroad engineering as well as of manufacturers and builders in general. The circular acknowledges the assistance rendered by the friends of the institution in the past with the hope that it may be continued now when the University is so much in need of help. Though there is no direct appeal in the circular, yet it is plainly evident that assistance is greatly needed and will be highly appreciated.

The following letter from a schoolboy at Waynesboro, Pa., is interesting in showing the thoughtfulness of the rising generation. It is a query which might well have come from a master mechanic:

To the Editor of the Railroad Gazette:

As you have answered other questions for me so nicely I will now trouble you with the following: Does the forward locomotive in a double-header have to exert more power to pull half of the trainload than the second one does, if the two locomotives are identical in size and weight. . . .

Watson C. Storer.

Perhaps some other student, old or young, may like to suggest the proper answer.

## NEW PUBLICATIONS.

*Dynamo and Motor Building for Amateurs.* By Lieut. C. D. Parkhurst, U. S. A. The W. J. Johnston Co., Limited, New York, 1893. Pages 163, price $1.

This book gives clear and concise instruction, with drawings, for the construction of such forms and types of motors and dynamos as are simply made and yet will produce fairly efficient results. While primarily intended for the amateur, the detailed information is valuable to all, particularly in the chapters on armature windings, connections and currents. Full descriptions are given for a small bi-polar shuttle armature motor, a small motor for a sewing machine, for which no castings or patterns are needed; another of more finished appearance of a regular factory-made type, and a dynamo of modern type capable of lighting 50 16-c. p. lamps of 125 volts. There is a chapter on armature windings, connections and currents. In the chapter on the 50-light dynamo all of technical points involved are fully treated.

*Proceedings*, American International Association of Railway Superintendents of Bridges and Buildings. We have received a copy of the proceedings of the third annual meeting of this Association from the Secretary, Mr. S. F. Patterson, of Concord, N. H. The pamphlet appears to have been edited very carefully and it contains all the papers and addresses in full. These include a number of drawings illustrating practice in curved trestles, station platforms and guard rails on bridges. There is also an illustrated description of a coaling station of the Philadelphia & Reading and one of a wooden surface cattle guard. The President of this Association is Mr. J. E. Wallace, of Springfield, Ill.

*New England Road Masters' Association.*—Proceedings of the Eleventh Annual Convention. The report of the last convention of the Association held in Boston, Aug. 16 and 17, has been issued by the Secretary, Mr. E E. Stone, of Springfield, Mass. It seems to be very full and complete. The pamphlet contains the address of Mr. P. H. Dudley on the Manufacture of Steel Rails, together with half-tone prints of the photographs shown by him at the time the paper was read. The President of this Association is Mr. G. L. R. French, of the Boston & Maine, who was formerly Secretary.

## TRADE CATALOGUES.

*The Jarecki Manufacturing Co.* (Limited), Erie, Pa., has published a 300-page illustrated catalogue of gas, water and steam fittings, pipe machinery, plumbers' and steam fitters' tools, together with supplies, drilling tools and engines for oil, gas and artesian well works. This catalogue is 7 in. × 11 in., printed on good heavy paper and profusely illustrated. With each article of manufacture are given the sizes and dimensions, inside and out, together with the list prices. Full descriptions of the larger machines are given, together with directions for use. Drawings are given so that parts may be ordered understandingly. The book has a complete index. The frontispiece contains two very nice illustrations of the company's shops. A number of pages are given to the illustration of air and gage cocks, oil cups, lubricators, steam whistles, water and steam gages, inspirators and injectors.

*The Joseph Dixon Crucible Co.*, Jersey City, N. J., has issued a revised edition of its pamphlet on graphite as a lubricant. The book contains comparative tests of the Dixon perfected graphite and the best sperm oil and the best quality of lubricating grease. Considerable space is given to the use of graphite for engine cylinders, with the experience of a number of engineers who have had experience with it. Ever since the tests by Prof. R. H. Thurston, conducted some years ago, the excellent qualities of graphite as a lubricant have been acknowledged, but it is necessary to always keep these matters before the uninformed, hence the new edition. Copies of this catalogue will be mailed by the company to any one interested in the subject.

*The Charles F. Swan Company*, 391 Ninth street, Brooklyn, N. Y., proprietors and manufacturers of the Little Giant and Goodbody's patent single and double connection oil and liquid compound injectors, have issued a 16-page 6 in. by 9 in. catalogue illustrating their apparatus for separating and preventing scales in boilers heaters and economizers. Advice is given as to what will remove different kinds of scale and as to the best apparatus and device for effecting such removal. It especially recommends the use of kerosene oil in connection with the Little Giant and other injectors. Over 40 letters of reference are given recommending the use of the company's injectors, a large number of which are from England.

*The Stark Machine & Tool Company*, Buffalo, N. Y., has issued a catalogue, standard size, 6×9 in., on tinners, machines and tools, including machinery for working sheet metals. It contains 115 pages and is fully and carefully illustrated. It includes folders, groovers and other shaping machinery for sheet metals, also general tools for cutting and working plate metals. It gives descriptions of each machine with the prices and weights of each.

## TECHNICAL.

### Manufacturing and Business.

Queen & Co., of Philadelphia, have brought out a new field glass, the "Abbe," named after the inventor of a new optical glass from which the lenses are made. The power of this field glass is from 7 to 10 times, a gain of 50 per cent. over that of the usual forms. This glass is recommended for private cars, "because it will not only prove useful to the officials, but a source of much pleasure to those who ride with them." For surveyors a special instrument is furnished, the metal parts being made of aluminum, greatly reducing the weight.

The Pratt & Whitney Co., of Hartford, Conn., has opened a branch office at 136 Liberty street, New York City.

The Kinsman Block System Co. has removed its general office from 96 Broadway to Room 511 Central Building, 143 Liberty street, New York.

The creditors of the Indianapolis Car and Manufacturing Co., of Indianapolis, Ind., have been awarded a dividend of 3.1 per cent. by the United States Court.

The firm of A. Whitney & Sons, of Philadelphia, the well-known manufacturers of wheels, axles and castings, will hereafter be represented in New York by Thompson & Inness, of 115 Broadway.

A company with $100,000 capital has been formed at Scranton, Pa., to manufacture the Walker automatic steam coupler. The officers are Victor Koch, President; Joseph Levy, Secretary, and A. L. Spencer, Treasurer.

The Smith Exhaust Ripe Co., of Doylestown, Pa., has received an order to equip several of the New York, New Haven & Hartford's high-speed passenger engines with the Smith exhaust pipe. This is the second order given by this road for Smith pipes within two months.

The Wells & Coutan Co., of 29 Gold street, New York, announce that they have added to their business the manufacture of single-bell chime steam whistles. These will be furnished at reduced prices, the patents under which they have heretofore been manufactured having expired.

Application has been made at Harrisburg, Pa., for the incorporation of the Pedrick & Ayer Co., of Philadelphia, formed for the purpose of taking over the business of the firm of Pedrick & Ayer, lately dissolved. The applicants for a charter are Daniel W. Pedrick, Eugene L. Manning, Charles A. Moore, Julius B. Price, Jr., and Charles G. Mayhew.

The committee appointed by the creditors of the Gilbert Car Works, of Troy, N. Y., report that all the creditors, except the holders of claims of about $10,000, have accepted the agreement prepared by the committee, which provides for the resumption of business pending the reorganization of the company. It is thought that the agreement will be soon accepted by all the creditors.

J. Albert Van Winkle, Receiver of the Riverside Bridge & Iron Works, at Paterson, N. J., offers the entire plant for sale. The shops are ready for immediate operation, being fully equipped with machinery and facilities for handling the heaviest as well as light work. The location is on the main line of the Erie Railroad, and the land includes 30 full city lots. The Receiver also offers for sale the balance of the stock of material consisting of shapes, bars, rivets, etc.

At the stockholders' meeting of the American Brake Beam Co., held in Chicago on Jan. 30, the following board of directors was elected: M. S. Frost, E. J. Frost, C. A. Newcomb, Sr., C. A. Newcomb, Jr., Charles T. Schoen, E. A. Schoen, D. P. Slattery, W. A. Pungs and F. B. Aglar. The officers for the ensuing year are: Charles T. Schoen, President; M. S. Frost, Vice-President; F. B. Aglar, Secretary; W. A. Pungs, General Manager. The officers report that the past year has been a satisfactory one for the company.

A receiver was appointed for the Pittsburgh Brass Co. last week on the petition of W. Harty, of Ontario, Can., and W. B. Rogers, of Pittsburgh. Joseph McNaugher, Vice-President of the company, was appointed Receiver and the business will be carried on as usual without interruption. It is claimed that the assets of the company are $400,000 and liabilities only $175,000, and that the suit for a receivership was brought by a few small stockholders, who for personal reasons wished to embarrass the company. The officers state that the Receiver will undoubtedly be discharged in a very short time.

The firm of Thorp & Bond has been formed by W. S. Thorp and C. F. Bond, to engage in structural iron work and the building of bridges, factories, warehouses and other buildings. Mr. W. S. Thorp was for about 10 years Superintendent of the iron construction for the Philadelphia public buildings and lately with the firm of Thorp, Conlan & Co., structural and ornamental iron workers, and as a member of that firm built many important buildings in Brooklyn and New York on the steel-skeleton construction principle. Mr. C. F. Bond was for nearly nine years connected with the Engineering Department of the New York Central & Hudson River Railroad and was formerly a member of Bond & Co., building contractors, who have done much work in New York and vicinity.

The General Manufacturing Company has been formed in New Jersey, with a capital of $2,500,000. The offices of the company are in the Havemeyer Building, New York. The officers are: Abner W. Pollard, President; Robert S. O'Laughlin, Vice-President; Louis A. Pollard, Treasurer; E. G. Kidder, Secretary; and J. B. Cleaver, Business Manager. The manufacture of graphite bearings, wheels and axles, pulleys and hangers, etc., will be one department of the company's business. Foundry, machine shops and boiler shops will be another department, where particular attention will be given to the manufacture of waterworks plants and hydraulic engineering generally. The full high pressure system as introduced by Ernest W. Naylor (Mem. Am. Soc. Mech. Engineers) into this country will be made a specialty, Mr. Naylor undertaking the superintendence of this department. Shops will be built at Bound Brook, N. J., as soon as possible.

William S. Eaton, who recently resigned as Treasurer of the National Tube Works Co., has been succeeded by Mr. Arthur F. Luke, Assistant Treasurer for four years. Mr. Eaton remains as director and as Chairman of the Finance Committee. He has contemplated retiring for some time, and now feels that with the company's affairs in a satisfactory condition he is entitled to some respite from business cares. Mr. Eaton's resignation has occasioned the publication of some interesting figures showing the growth of the business of the National Tube Works. Mr. Eaton's connection with the company

began in 1869. Then it had only $100,000 and small works at East Boston. Now it has the largest plant of its kind in the world, a share capital of $11,500,000 (half common and half preferred stock), $1,500,000 surplus of bills receivable over bills payable; $2,000,000 in material on hand and manufacturing plants that cost $7,000,000. The sales of the company for the year ending July 1 last were $18,000,000, and the stockholders' profit about $900,000, which, after paying 7 per cent. on the preferred stock, left $500,000 surplus, which was invested in the company's new steel plant. It is understood the company during the present depression is doing about 60 per cent. of the business it was doing a year ago.

### Iron and Steel.

The Ajax Steel Coupler Co, of Chicago, has been incorporated in Illinois by Lynden A. Seymour, George S. Cole and Arista B. Williams.

The Wheeling Steel & Iron Co. at its annual meeting elected the following directors: John P. Gilchrist, C. R. Hubbard, W. F. Stifel, Joseph Bell, C. B. Caldwell, W. A. Isett, G. K. Wheat, John G. Hoffman and Alonzo Loring. The steel plant of the company has been started up with a full force in every department.

Two lighthouses are now being built by Philadelphia iron works for the United States Lighthouse Board to replace the present structures at Cape Charles and Hog Island, Va. Their height is to be 192 ft. 8 in. The diameter at the base is 53 ft., tapering to 11 ft. at the lantern. Each structure is to consist of heavy cast-iron columns arranged in octagonal form around a central cast-iron cylinder 9 ft. in diameter. This cylinder contains a cast-iron spiral stairway.

### New Stations and Shops.

Work is going forward on the construction of machine shops at Hillyard, Washington, for the Great Northern, and the shops will be ready for occupation by March. Between 300 and 400 employees will be put to work, it is said.

### Dry Dock at South Chicago.

The Chicago Shipbuilding Company some time ago made plans for a dry dock of such size as to accommodate the largest lake steamers. It is to be operated in connection with their shipbuilding works at South Chicago. It is to be 425 ft. long, 100 ft. wide at the top and 80 ft. at the bottom. The gate is to be 70 ft. wide and the water 17 ft. deep over the miter sill. The largest boat on the lake at present is 380 ft. long, and this will probably be the maximum until harbor facilities are improved. The company is providing, however, for an ultimate extension to 475 ft. Work was commenced, but discontinued. It is now to be taken up again and will be completed by Sept. 1.

### The Chicago Board of Trade Tower.

It has been definitely settled that the tower of the Chicago Board of Trade Building will be torn down on account of the unequal settling of the foundation. The tower is of granite, and to the top of the weather vane is 328 ft. high. Its weight of about 1,500 tons has caused a very unequal settlement of the building, cracking the walls considerably and leaving the tower 8 in. out of plumb. It will be taken down to the eaves, and the north and west walls of the building braced and strengthened, It is very likely that a light tower will be erected afterward. The work is in charge of Mr. Charles H. Rutan.

### An Electric Marine Signal Register.

A system of signaling from the captain of a vessel to the engineer by electric bells has recently been invented by a Mr. Robert Eruschaw, of Chicago. When operated, there is a simultaneous display of signals to both sender and receiver. The unique feature of the mechanism is the automatic "set back," that is, after a signal is given and registered, the giving of the next signal first throws back the register of the former one before the new signal is displayed. This is a device that could be applied to elevators, etc., with advantage. The inventor is perfecting a device that will print in a fire and waterproof box all signals to the engineer with the time, date and rate of speed attached, so if the vessel sinks, and the box can be secured, it will be positive evidence as to whose fault caused the accident.

### The New White Star Steamship Cevic.

The new White Star line steamer Cevic has made her maiden voyage from Liverpool to New York. This vessel is the largest freight carrier afloat. She is 515 ft. over all; load-water line length, 500 ft.; 60 ft. beam, and is 28 ft. deep; her gross tonnage is 8,315 tons, and her net is 5,402 tons. Her decks are fitted to carry 800 head of cattle, and this can be increased 250 head by carrying additional stalls. Amidships there are stalls for 20 horses. The new steamer's engines are triple expansion and of 3,650 H. P. She has twin screws and carries four pole masts and one funnel. Her builders were Harlan &Wolf, of Glasgow. She was built to make 14 knots an hour.

### Hall Station Annunciators on the Illinois Central.

The Hall Signal Company has recently put up electric signals in all the suburban stations of the Illinois Central near Chicago where the tracks have been elevated. Since the elevation of the tracks passengers have found it impracticable to wait in the stations for the approach of the train because the rooms were so far from the track, and have been obliged to wait on the elevated platform, which is an uncomfortable place in the winter. To enable the passengers to wait indoors these signals were put up. The signal is a red disc with a bell, which is rung on the approach of a train. There are two holes for the appearance of the disc, one with "north" and the other with "south" painted under it, an arrow placed over each showing the direction of the train more clearly. These signals are operated from the same track instruments and relays as the block signals, and are worked in an open circuit, the discs being in multiple circuit with the bells. The magnets for moving the discs have circular armatures, like those in Hall signals, which allow the discs to hang vertically below the edge of the holes till the current is turned on. The approaching train in reaching the second block signal from the station completes the circuit and puts the annunciator in action. It then remains in that position until the next block is reached by the train.

### New Lake Steel Steamer.

Work is now progressing on a 5,000-ton steel steamer for a syndicate composed chiefly of people interested in the Chicago Shipbuilding Company. The cost of the boat will be about $200,000. The company has built several large boats since its organization in 1890, and with the completion of the dry dock will be prepared to build or repair the largest boats on the lakes. The company is now in a position to repair tugs, yachts and other small craft, but uses instead of a drydock a marine railroad. This will not be abandoned after the drydock is built, as for small craft it possesses many advantages over drydocks.

### A "Fountain" Brush.

The engraving shows a new car-washing brush, with its

easily detachable parts to show the con attached to the gal- and the supply of the operator with the continuous spray of the upper side of the the brush, among the varnish cannot be and dirt is flowed off. with or without a the back for drying that car and window can be done more and with less scratch with an ordinary brush It is already in use on a and street railroads, by the General Agency New York.

separated in order struction. A hose is vanized iron handle water is adjusted by regulating cock. A water is thrown over brush and also through bristles, so that the injured and the sand The brushes are made rubber "squilgee" on windows. It is evident washing with this tool thoroughly, quickly ing of surfaces than and buckets of water. large number of steam and is made and sold Co., 115 Broadway,

### Gold Car Heating System in England.

Continuous steam heating on English railroads, which has been as unqualified a success as in this country, has had to meet and overcome conditions not existing here. The officers of the Great Northern, and the Manchester, Sheffield & Lincolnshire, which had a number of cars equipped with the Gold storage system last winter, were able to test the system in an unusually cold winter, and found that it worked well, maintaining a sufficient and even temperature in all cars of the train equipped with the apparatus. The result of that experience has been so satisfactory that other trains on these lines have been fitted with the storage system.

An improvement has been introduced recently by which the temperature in each compartment can be regulated by the passengers. This is accomplished by a louvre frame placed over the storage heater. The frame contains a movable slide, which opens or closes the apertures, through which the heat escapes into the compartment as may be required. Small levers placed conveniently on either side of the compartment regulate the slides. In an experimental trip by a train made up to run from Doncaster to Lincoln and return, the thermometers in the carriages registered 64 deg. F., while outside a bitter cold wind was blowing. In one of the empty compartments in which the windows and ventilators were closed, with the regulating louvre also closed, the temperature was 48 deg. F., a difference of 16 deg.

### Second Hand Passenger Equipment.

The Jackson & Sharp Company, of Wilmington, Del., has for sale a considerable amount of passenger equipment, which has been acquired from the Pennsylvania Railroad. The cars have been thoroughly repaired and are in exceptionally good condition. There are 20 passenger cars, 9 combination and 5 express cars. The passenger cars include 6 coaches over 52 ft. long with six-wheel trucks; 14 coaches, 46½ ft. long with four-wheel trucks. The combination cars are 52½ ft. and 46½ ft. long, all with four-wheel trucks, and the express cars are 32 and 34 ft. long.

## THE SCRAP HEAP.

### Notes.

The Fall Brook Railway has now carried passengers for 31 years without killing a single one, and only six have been injured, mostly by their own fault. During the past year one employee was killed and 43 injured, the train mileage being over 2,000,000.

A man prowling around an express car at the Baltimore & Ohio station in Washington, D. C., one night last week, was shot and wounded by Edward Mills, a guard in the employ of the United States Express Company. Mills was arrested, but every one conversant with the circumstances exonerates him from blame, and the newspapers commend his action. Three train robbers have been sentenced to 15 years' imprisonment each in Iowa. At Pulaski, Va., on the night of Jan. 1, three negroes, in jail for attempting to wreck a train on the Norfolk & Western, were taken out by a mob, carried into the woods and hung to trees, with the purpose of extorting confessions, but they were let down before they were strangled and were returned to jail.

Senator Gorman, of Maryland, has introduced in Congress a bill permitting railroads to make pooling contracts, subject to the approval of the Interstate Commerce Commission. In the New Jersey Legislature a bill has been presented increasing the powers of city governments in the matter of elevating or depressing railroad tracks. In Maryland the legislature is still considering amendments to the law relative to heating passenger cars by continuous systems, and a member has also presented a bill changing the basis of taxation of railroads. In Ohio a bill has been presented which provides for taxing the railroads to pay the expenses of the State Railroad Commission. This state has for some time surpassed all others in the variety and novelty of the railroad laws proposed, and Senator Lawler strives to maintain this reputation by presenting a bill requiring the railroads to run their pay cars on time and to give the men five days' notice of the time and and place of payment. There are innumerable minor provisions and safeguards, and a $1,000 fine for violation. This bill seems to be even more unnecessary than the usual run. Most railroad men of our acquaintance are willing to take their pay on five minutes' notice, or even five seconds.

The changes in rates of pay and in working hours which have been reported during the past week are various, some indicating prosperity and some adversity. The Erie has discharged 300 men from the shops at Buffalo, and the Pennsylvania discharged 100 or more on the Pittsburgh division Feb. 1. The Lake Erie & Western "has just caught the hard-times fever," and has discharged a lot of freight trainmen. The Nashville, Chattanooga & St. Louis has notified its engineers, firemen, conductors and brakemen that the wages agreement heretofore in force with these classes must be abrogated March 1, as the company is unable longer to pay the rates agreed upon. In contrast to the foregoing items the East Tennessee, Virginia & Georgia has restored the wages of shopmen and trainmen to the rates in force previous to last August, when they were reduced 10 per cent.; the Denver & Rio Grande has restored salaries in the general offices which were reduced by the voluntary action of the employees last September, and the Rio Grande Western has restored the 10 per cent. taken off of the pay of engineers, firemen and brakemen last October. The Reading has increased the working hours in some of its shops.

Senator Allen, of Nebraska, has introduced in Congress a bill for the "prevention of the abuse of the writ of injunction." The bill provides that it shall be unlawful for any Court of the United States, or Judge thereof, to issue a writ of injunction, mandate, or restraining order against any labor organization, its officers or members, in any manner affecting their full freedom to peacefully and quietly quit the service of any person or corporation at any time they may see proper to do so. Mr. McGann, of Illinois, introduced in the House a resolution directing the Judiciary Committee to investigate the charges made against Judge Jenkins, who issued the injunction against Northern Pacific employees in Wisconsin, and to report whether they warrant the presentment of articles of impeachment; also to report what action is necessary to prevent a recurrence of the conditions now laid by the injunction upon the Northern Pacific and other railroad employees and labor organizations. The resolution has a long preamble, reciting the right of employees to organize and strike, and Judge Jenkins' order restraining the employees of the Northern Pacific from exercising this right.

### Metropolitan "L" Route Not To Be Changed.

Officials of the Metropolitan Elevated road in Chicago deny that an attempt will be made to run the line west on Madison street from Forty-eighth. The route of the northwest branch will be that previously determined on, namely, north from a point between Paulina and Wood streets to Milwaukee avenue, and thence northwest to Logan square. The structure of the main line is very nearly completed, but is not likely to be extended west beyond Forty-eighth street until the terminus at Fifth avenue is completed and the branch lines begun. There is to be a branch from the northwest stem running parallel to North avenue, west to Humbolt Park.

**A 60,000-lb. Freight Car Is a Small Affair.**

The twin-screw freight steamship Cevic, of the White Star Line, sailed from New York to Liverpool, Jan. 30, with what is said to be the largest cargo ever stowed in a single vessel since Noah's time. Exclusive of 820 head of Western steers, the cargo consisted of 14,000 tons of merchandise, including 150,392 bushels of corn, 9,030 bales of cotton, 3,200 quarters of beef, 1,955 pigs of copper, 2,328 pigs of lead, 3,491 bags of flour, 56 logs of mahogany, 511 bales of hay, 3,338 boxes of cheese, 1,955 barrels of oil, 1,999 barrels of green hides, 639 barrels of wax and 408 boxes of bacon. The value of the entire cargo is estimated at nearly $500,000. The Cevic is 515 ft. long, 60 ft. wide and 28 ft. deep. She is commanded by Capt. Robert Nicol. He expects to cross the Atlantic in about nine days.

**Crossing Injunction Dissolved.**

Judge Tuthill has dissolved the injunction granted the Chicago, Burlington & Quincy and the Pittsburgh, Cincinnati, Chicago & St. Louis railroads to prevent the West Chicago Street Railroad from crossing their tracks in Chicago. The Burlington injunction was obtained from Judge Tuley, March 30, 1893, to prevent the street car company from crossing the tracks on Ashland and Western avenues, and the Pan-Handle injunction from Judge Collins, March 28, to prevent a crossing at Robey street; both railroads claiming to be owners in fee of parts of the street where the street car company wished to cross.

**Elevation of Tracks at Minneapolis.**

The long contest over the change in grade of the tracks of the Hastings & Dakota Division of the Chicago, Milwaukee & St. Paul at Minneapolis has been amicably adjusted. The company agrees to elevate the tracks from Washington avenue to Lake street 4 ft. above the present grade, and the streets will pass under instead of over the track. From Lyndale avenue to the Lake of the Isles the grade will not be changed. Hennepin avenue will cross the tracks on an overhead highway bridge. The bridges will be erected from time to time as travel on the several streets increases. The improvements contemplated for this year will cost not less than $300,000.

**The Race of the Majestic and the New York.**

A cable dispatch from London explains the result of the race between the steamers Majestic, of the White Star Line, and New York, of the American Line, for London. Both ships left New York, on Jan. 24, and the mails carried by the New York to Southampton arrived in London on the 31st, five hours later than those carried by the Majestic to Liverpool. The explanation is that when an hour out from New York the ships encountered a dense fog in which the New York anchored for 6¼ hours, while the Majestic, it is supposed, pushed through without stopping, which gave her that number of hours the advantage. Besides this, the Majestic had just come out of a graving dock where her bottom had been scraped and painted, while the New York has not been docked for that purpose for six months.

**A Railroad to the Soudan.**

It is reported that Hebron Harris, of Ottawa, Canada, has received a contract for supplying ties and building material for the projected railroad from Suakim, on the Red Sea, to Berber, on the Nile River, above Khartoum.

## LOCOMOTIVE BUILDING.

Coxe Bros., of 143 Liberty street, New York, have this week let a contract for 10 passenger locomotives for the Delaware, Susquehanna & Schuylkill road.

## BRIDGE BUILDING.

**Charleston, W. Va.**—The City Council has awarded the contract for a steel plate girder bridge over the Baltimore & Ohio tracks at Charles street to the Vulcan Road Machine and Bridge Co., of Charleston. Gen. T. G. Baylor is engineer.

**Dorchester County, Md.**—A bill has been introduced in the Maryland Legislature to authorize the County Commissioners of Caroline and Dorchester counties to build a free bridge over the Linchester River.

**Eganville, Ont.**—The Reeve of Gratton Township is calling for tenders for the construction of a bridge at Constant Creek.

**New York City.**—Bids were opened on Jan. 22 by the Department of Public Parks for the construction of the Ogden avenue (or east) approaches to the Seventh avenue swing bridge, New York City. The approach is a plate girder viaduct 330 ft. long, consisting of six spans. Alfred P. Boller is the Consulting Engineer. The successful bidders were Stewart & McDermott and Passaic Rolling Mill Co. (b); the only other bid was from Sooysmith & Co. (2). Below are given some of the principal items:

| Item. | Quantity. | Unit Prices. 1. | 2. |
|---|---|---|---|
| Foundation pits | 2,400 cu. yds. | 5. | 4.50 |
| Sand filling around piles | 300 " " | 1.25 | 1.50 |
| Concrete filling around piles | 600 " " | 7.25 | 7. |
| Piles less than 40 ft. | 162 | 8. | 9. |
| Piles over 40 ft. | 162 | 11. | 12. |
| Y. P. grillage | 45 M ft. B. M. | 35. | 40. |
| Pneumatic caissons | 815 cu. yds. | 31. | 31. |
| Pier masonry | 522 " " | 9. | 9.50 |
| Twin pier masonry | 220 " " | 15. | 14.50 |
| Abutment masonry | 300 " " | 13. | 12.50 |
| Granite coping and caps | 900 cu. ft. | 2.25 | 2.40 |
| Ironwork | 1,100,000 lbs. | 2.8 | 2.98 |
| Totals | | $99,326.50 | $101,750.00 |

The Passaic Rolling Mill Co. also has the contract for the swing span. The 155th street viaduct, which is the western approach of the bridge, was built by the Union Bridge Co.

**Reading, Pa.**—A new iron county bridge, with an 80-ft. span and 16-ft. wide, is to be erected over Perkiomen Creek at Klotz's mill in Hereford Township at a cost of about $2,500.

**Red Wing, Minn.**—A special election was held on Feb. 8, to vote upon the proposition to vote bonds to aid in the construction of a wagon bridge across the Mississippi River. Since it has been decided to construct a highway instead of a combination bridge, the Duluth, Red Wing & Southern Railroad has strenuously opposed the proposition.

**Rowlesburg, W. Va.**—A movement is on foot for the erection of a new steel bridge across the Cheat River at Rowlesburg, W. Va. The County Court of Preston County has not yet taken any definite action toward building the bridge, but its erection may be ordered before next July.

**Youngstown Bridge Co.**—The plate-girder draw span for the Washington & Chetapeake Beach Ry., 182 ft. extreme length, designed by C E. Fowler, Chief Engineer of the Youngstown Bridge Company, is nearly the longest plate-girder draw in the world. Possibly the longest drawbridge of this type is the four-track plate-draw over the Bronx River, now building for the New York, New Haven & Hartford road by the Passaic Rolling Mill Co., extreme length 186 ft.

The Youngstown company is also building the tubular substructure for the Washington road, and has besides in its shops a pit-furnace building, 54 ft. × 175 ft.; a mill building, 79 ft. × 420 ft.; a hot-bed building, 85 ft. × 140 ft., and a saw shed, 35 ft. × 86 ft., for the Ohio Steel Company. Also a draw span 142 ft., a fixed span and substructure over Three-Mile Creek at Mobile, Ala.

## CAR BUILDING.

The Minneapolis, St. Paul & Sault Ste. Marie is reported in the market for cars.

The Baltimore & Ohio Southwestern has given out a contract for 800 cars to the Pullman Car Works.

The following orders have been placed for street cars: People's Traction Co., Philadelphia, 300 cars to the St. Louis Car Co.; Electric Traction Co., Philadelphia, 40 cars to the Pullman Co. and 10 cars to the Jackson & Sharp Co.

The Carlisle Manufacturing Co. started up its car shops at Carlisle, Pa., last week. Besides the order for 200 cars from Coxe Brothers & Co., an order for narrow gage coal cars for export to Cuba has been received by the company.

Coxe Brothers & Co. let contracts last week for 1,000 gondola coal cars for the Delaware, Susquehanna & Schuylkill road. These cars are regular Pennsylvania standard hopper gondola cars of 60,000 lbs. capacity, and will have Westinghouse air-brakes. The order is divided among the following firms: Murray, McDougal & Co., of Milton, Pa., 450 cars; Carlisle Manufacturing Co., Carlisle, Pa., 200 cars; Jackson & Woodin Manufacturing Co., Berwick, Pa., 175 cars, Lebanon Manufacturing Co., Lebanon, Pa., 175 cars.

## MEETINGS AND ANNOUNCEMENTS.

**Dividends:**

Dividends on the capital stocks of railroad companies have been declared as follows:

*Camden & Atlantic*, 4 per cent. on the preferred stock, payable Feb. 20.

*Chicago & Alton*, quarterly, 2 per cent. on the preferred and common stocks, payable March 1.

*Cleveland & Pittsburgh*, quarterly, 1¾ per cent. on the guaranteed stock, payable March 1.

*St. Paul & Duluth*, semi-annual, 2½ per cent. on the preferred stock, payable March 1.

**Stockholders' Meetings.**

Meetings of the stockholders of railroad companies will be held as follows:

*Baie des Chaleurs*, special, Montreal, Feb. 19.

*Chester & Lenoir*, special, Gastonia, N. C., Feb. 14.

*Cumberland Railway & Coal Co.*, annual, Montreal, Canada, Feb. 14.

*Delaware, Lackawanna & Western*, annual, New York City, Feb. 20.

*Grand River Valley*, Jackson, Mich., April 25.

*Missouri Pacific*, annual, St. Louis, Mo., March 13.

*Monterey & Mexican Gulf*, special, New York City, Feb. 20.

*New York, Lake Erie & Western*, special, New York City, March 6.

*Nicola Valley*, special, Vancouver, B. C., Feb. 20.

*Peoria & Eastern*, annual, Danville, Ill., Feb. 14.

*Philadelphia & Erie*, annual, Philadelphia, Pa., Feb. 12.

*St. Louis, Iron Mountain & Southern*, annual, St. Louis, Mo., March 13.

*Summit Branch*, annual, Philadelphia, Pa., Feb. 13.

*Western Terminal Co.*, special, Pittsburgh, Pa., Mar. 20.

**Technical Meetings.**

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car Builders' Association* will hold its annual convention at Saratoga, N. Y., June 12. The hotel headquarters will be at Congress Hall, H. S. Clements, Manager.

The *Master Mechanics' Association* will hold its annual convention at Saratoga, N. Y., in June, immediately following the M. C. B. convention.

The *Freight Claim Association* will hold its annual meeting in Louisville, Ky., March 14.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month. The next meeting will be on Feb. 14. The subject for discussion will be Lubrication of Journals.

The *Western Railway Club* meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *Northwest Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, except during June, July and August, at 8 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

**M. C. B. Circular on Compressed Air and Hydraulic Machinery.**

The committee on compressed air and hydraulic appliances of the Master Car Builders' Association has issued a circular soliciting replies to the following questions:

1. Have you in use any appliances for using compressed air or hydraulic pressure?

2. If so, in what operations could such appliances be used so as to reduce the cost of car construction and repairs, and car cleaning in car shops and yards?

3. Please give maker's name of any appliances you may have or are familiar with, and full information on any device you have originated and adapted to such service on your road, together with drawings, sketches, photographs, etc.

The reply should cover the application of compressed air, hydraulic pressure, and either hand power, pneumatic or electric devices to the movement of material to be worked, or as a motive power to operate machines or to any device used in car shops and car repair yards, to economically operate the same.

Answers may be sent to J. C. Barber, Northern Pacific Railway, St. Paul, Minn., before Feb. 15.

J. C. Barber, William Garstang, William Cormack, J. R. Skinner, H. L. Preston, Committee.

**Engineers' Club of Cincinnati.**

There were 28 members present at the last meeting. Col. Latham Anderson read selections from a translation by himself of an article by M. Comoy, Inspector-General of Bridges and Roads, in the *Annales des Ponts et Chaussees* on "Various Methods Used for the Consolidation of Earth Slides." The paper was accompanied by drawings and a lively interest was taken in the subject.

**New England Railroad Club.**

The regular meeting of the club will be held at Wesleyan Hall, 36 Bromfield street, Boston, Wednesday, Feb. 14, 1894, at 7:30 p. m. The subject for discussion will be: "Lubrication of journals on rolling stock; the cause of hot boxes, and what can be done to obviate them." F. D. Adams, M. C. B., Boston & Albany, will open the discussion.

## PERSONAL.

—Mr. James Helms, Assistant Master Mechanic of the Louisville, Evansville & St. Louis, died at his home in Princeton, Ind., Jan. 25.

—Mr. Edward P. Mallinson has been appointed Master Mechanic of the Brooklyn Elevated Railroad, succeeding Mr. E. M. Hedley, who resigned recently.

—Mr. Arja Williams, of the Lackawanna Iron & Steel Co., was last week elected Assistant Secretary, vice E. L. Linde, deceased. He has been with the company for 26 years.

—Gen. John Echols, Vice-President of the Chesapeake, Ohio & Southwestern, and one of the Receivers of the property, has again assumed the title of General Manager of that railroad.

—Mr. J. W. Schaub, Mem. Am. Soc. C. E., has resigned his position as Chief Engineer of the Pottsville Iron & Steel Co., and General Manager of the Pottsville Bridge Works, to take effect March 1 next.

—Mr. T. F. Dunaway, Division Superintendent of Missouri Pacific lines with headquarters at Osawatomie, Kan., has resigned to accept a position as Superintendent with the Union Pacific, Denver & Gulf, with headquarters at Denver, Col.

—Mr. Pemberton Smith, who has been Superintendent of the Hudson River Bridge Company, controlling the New York Central Bridges across the Hudson River at Albany, has resigned to accept a position with the New York Car Wheel Works.

—Mr. Arthur S. Busby, formerly General Passenger Agent of the Intercolonial Railroad, died at Moncton, N. B., last week. Mr. Busby was District Superintendent of the Intercolonial Railroad for nearly 10 years up to 1881, when he became General Passenger Agent. He retired from that position about two years ago on account of his age, being pensioned by the Dominion Government, which operates the Intercolonial.

—Dr. John Henry Murphy died at St. Paul, Minn., on Jan. 31. Dr. Murphy was Surgeon-in-Chief of the Great Northern; Chicago, St. Paul, Minneapolis & Omaha, and Chicago, Burlington & Northern, and Local Surgeon for the Chicago, Milwaukee & St. Paul; Minneapolis, St. Paul & Sault Ste. Marie and Northern Pacific. He was president of the National Railway Surgeons' Association for 1891-92, and a member of other medical associations.

—The resignation of Mr. H. W. Reed as Master of Roadway, at Waycross, Ga., for the Savannah, Florida & Western is announced. Mr. Reed will leave the railroad service to become an officer of a bank at Brunswick, Ga. Mr. Reed is known as President of the Roadmasters' Association of America, an office which he has filled with ability for several years. His retirement from railroad service will be learned with regret by all interested in roadway affairs.

—Mr. W. Lavery, Master Mechanic of the New York, Lake Erie & Western at Susquehanna, Pa., has been appointed Assistant Superintendent of Motive Power, with headquarters at Cleveland, O., in charge of the New York, Pennsylvania & Ohio. He succeeds Samuel Higgins, who resigned to become Superintendent of Motive Power of the Lehigh Valley. Mr. Lavery was formerly Master Mechanic of the New York, Lake Erie & Western at Galion, O., and later at Meadville, Pa. and has been Master Mechanic at Susquehanna, Pa. since 1888.

—Mr. J. Elfreth Watkins, who had charge of the Pennsylvania Railroad exhibit at the World's Fair, at Chicago, as assistant to Mr. T. N. Ely, has resigned from the Pennsylvania Railroad service to accept a position as "Director of the Department of Industrial and Mechanical Art" at the Columbian Museum in Chicago. Mr. Watkins was for some years a civil engineer on the Pennsylvania Railroad, and was afterward curator in the transportation section of the Smithsonian Institution until 1892, when he resigned to take charge of the preparation of the Pennsylvania's World's Fair exhibit.

—Mr. Gavin Campbell, formerly General Superintendent of the Wisconsin Central lines, died at his home in Stevens Point, Wis., on Jan. 31. Mr. Campbell had been in poor health for about two years. In March, 1892, he visited California, and was much improved, but on the return trip contracted a severe cold, from the effects of which he never entirely recovered. Mr. Campbell was born at Glasgow, Scotland, in 1836, and had been connected with the Wisconsin Central Company since 1871, at first as Master Mechanic, then as Division Superintendent, and from 1889 until a few months ago as General Superintendent. From 1885 to 1889 he was General Manager of the Green Bay, Winona & St. Paul road.

—Colonel Samuel C. Slaymaker, of Lancaster, Pa., died in that city suddenly on Feb. 2. His first important professional work was in 1857 as an Assistant Engineer under Mr. John C. Trautwine on the Honduras Interoceanic Railroad. Returning to the United States in 1860 he became Assistant Engineer on the Reading & Columbia, then being constructed, and was afterwards a Resident Engineer of the Philadelphia & Reading, Assistant Engineer on the Pennsylvania and more recently Chief Engineer of the Lancaster, Oxford & Southern and the Reading, Lancaster & Baltimore,

short roads in Pennsylvania. At the time of his death he was City Engineer of Lancaster and Chief Engineer of the Lancaster electric railroad.

—The Baltimore & Ohio changes in the transportation department which have been made public one by one for several weeks were last week officially announced. Mr. Thomas Fitzgerald has been promoted from Superintendent of Transportation and Superintendent of the Baltimore Division to be General Superintendent of the lines east of the Ohio River, an office which has been vacant, as already stated, since the resignation of Mr. Alfred Walter in 1892. Mr. J. Van Smith, Superintendent of the Philadelphia Division, becomes General Superintendent west of the Ohio River, where he succeeds Mr. Robert Campbell, the present General Manager of the road. Mr. C. C. F. Bent becomes Superintendent of the Philadelphia Division and Mr. John E. Spurrier, Trainmaster of the Baltimore Division, becomes Superintendent of that division.

—Mr. W. T. Manning has been promoted to be Chief Engineer of the Baltimore & Ohio road. Mr. Manning has been at the head of the engineering department of the road for over a year and a half. He was made Acting Chief Engineer in October, 1892, when Colonel Douglas resigned, but he had been acting in that capacity for some months previous. Mr. Manning has had a thorough training and wide experience for the position he now holds. He has been with the Baltimore & Ohio about 20 years, most of the time in the engineering department, but his service was varied with duty in other departments for a number of years. Mr. Manning has now held every position in the engineering department, and has been in charge of costly and important improvements on the system. He was Chief Engineer of the Staten Island Rapid Transit, when that line was being developed for the freight traffic of the Baltimore & Ohio. For some years he has been Consulting Engineer of the Pittsburgh & Western. In addition to these offices he is now Chief Engineer of the Baltimore Belt. The changes at Harper's Ferry have also been under his immediate direction.

## ELECTIONS AND APPOINTMENTS.

*Addison & Pennsylvania.*—At the annual meeting, held in New York City, the following directors were elected: T. C. Platt. C. L. Pattison, William Brookfield, A. C. Gurnee, F. H. Platt, W. G. Oakman, George R. Sheldon, J. E. Jones, Theodore F. Wood, Frank M. Baker, B. H. Parkhurst, C. S. Brice and R. W. Clinton. The following officers were elected: President, T. C. Platt; Vice-President, William Brookfield; Treasurer, Albert Howe; Secretary, J. E. Jones; General Superintendent, Frank M. Baker.

*Baltimore & Ohio.*—The following appointments have been made, taking effect from Feb. 1: William T. Manning (Acting Chief Engineer) to be Chief Engineer, with headquarters at Baltimore; Thomas Fitzgerald (Superintendent Transportation and Superintendent Baltimore Division) to be General Superintendent of Main Stem and Branches and Philadelphia Division, with headquarters at Camden Station, Baltimore. He will continue in the position of Superintendent of Transportation; J. Van. Smith (Superintendent Philadelphia Division and General Agent at Philadelphia) to be General Superintendent of the Trans-Ohio Divisions, to fill the vacancy occasioned by the promotion of R. B. Campbell to be General Manager, with headquarters at Chicago; C. C. F. Bent to be Superintendent of the Philadelphia Division and General Agent at Philadelphia, vice J. Van Smith, promoted, with headquarters at Philadelphia: John E. Spurrier (Trainmaster Baltimore Division) to be Superintendent of the Baltimore Division, vice Thomas Fitzgerald, promoted, with headquarters at Camden Station, Baltimore. William Alvey (Agent, Washington, D. C.) to be General Agent at Washington.

*Bentonville, Pineville & Northwestern.*—The following are the incoporators of this road, recently chartered in Missouri: A. C. Walters, M. N. LaMance, J. W. Shields, W. E. Smith, G. T. Woolard, A. W. Noel, O. St. John, M. R. DeGroff, J. P. Caldwell, Pineville, Mo.; W. D. Manck and C. M. Robinson, Bentonville, Ark.

*Boston & Albany.*—Thomas B. Purves, Jr., has been appointed Master Mechanic of the Boston Division to succeed William H. Taft, appointed Acting Superintendent of Motive Power.

*Cheat River.*—The first annual meeting was held at Pittsburgh last week, when the following officers were elected: President, W. S. Guffy; Vice-President, Emmet Queen; Treasurer, George Heard; Secretary, W. F. Johnson. Directors: W. S. Guffy, Emmet Queen, W. F. Johnson, George D. Prentiss, and George Heard. The company's office at present is at Pittsburgh.

*Chicago & Southeastern.*—Andrew Stevens, of Decatur, Ill., has been appointed General Traffic Manager, with headquarters at Anderson, Ind.

*Eastern Nebraska & Gulf.*—Articles of incorporation of the company have been filed in Nebraska by A. W. Swanitz, of New York; F. W. Kimball, of Austin, Minn.; C. J. O'Connor and Thomas Ashford, Jr., of Homer, Neb.; W. C. McNamara, F. A. Seaman and J. B. Keefe, of Sioux City, Ia.

*East St. Louis Connecting.*—John J. Baulch has been appointed General Freight Agent of the Wiggins Ferry Co. and controlled lines, with headquarters in the Republic Building, St. Louis, Mo.

*Fort Worth & Denver City.*—Wm. W. Monk has been appointed General Eastern Agent of this company, with office at 353 Broadway, New York City.

*Great Northern.*—The following appointments have been announced: F. R. Buskirk, Assistant Superintendent of the St. Cloud and Fergus Falls Division; J. R. Van Cleave, Superintendent of the Cascade Division, headquarters at Leavenworth, Wash., vice A. J. McCabe, resigned; W. W. Currier, Acting Superintendent of the Montana Central, headquarters at St. Paul, vice C. H. Jenks, resigned; William K. Tew, Assistant Superintendent Cascade Division, headquarters at Leavenworth, Wash.

*Lehigh Valley.*—The following appointments have been announced: S. J. Bassett, General Agent, with office at 201 Washington street, Boston, Mass.; Samuel A. Story, Foreign Freight Agent, office, room 501, Chamber of Commerce Building, Boston, Mass.; L. W. Frost, Central New England Agent, office, Hoadley Building, New Haven, Conn.

*New York, Lake Erie & Western.*—W. Lavery has been appointed Assistant Superintendent of Motive Power, with office at Cleveland, O., vice S. Higgins, resigned.

*Providence & Worcester.*—At the annual meeting held in Providence, R. I., Feb. 5, the following directors were elected: Moses B. I. Goddard, Warwick, R. I.; Joseph E. Davis, Boston; Jonas G. Clark, Worcester; John W. Danielson, Providence; G. Marston Whitin, Whitinsville, Mass.; A. George Bullock, Worcester; John Nicholas Brown, Newport, R. I. Moses B. I. Goddard was re-elected President.

*Texas Midland.*—B. R. Hanson has been appointed Master Mechanic with headquarters at Terrell, Tex.

*Toledo, St. Louis & Kansas City.*—H. A. Boomer, formerly chief train dispatcher, has been appointed Division Superintendent, with office at Frankfort, Ind., vice C. N. Pratt, resigned.

*Washington & Columbia River.*—Charles Herman has been appointed General Freight and Passenger Agent, to succeed W. F. Stamsley, resigned. A. R. Zabriskie, Secretary, has been appointed Treasurer, to succeed Charles Herman, and will still continue to act as Secretary. Appointments taking effect March 1.

*Wiscasset & Quebec.*—At a meeting of the projectors held in Wiscasset, Me., the following directors were elected: George B. Crosby, Albion; W. F. P. Fogg, I. C. Libby, C. W. Abbott, Waterville; Richard T. Rundlett, Henry Ingalls, Wiscasset; Amos F. Gerald, Fairfield; A. R. G. Smith, Whitefield; A. M. Card, Alna. George H. Crosby was elected President and General Manager, and Warren Nickerson, Chief Engineer.

## RAILROAD CONSTRUCTION,
### Incorporations, Surveys, Etc.

**Baltimore & Northern.**—The capital stock of this new company amounting to $1,000,000, is reported to have been entirely subscribed for. The company was incorporated Nov. 26, 1893, by William Gilmor, Granville O. Wilson, S. Johnson Poe and John Henry Miller, of Baltimore, and Moses H. Houseman, of Pennsylvania. The road, as proposed, is to extend through Baltimore and Harford counties in Maryland, to a point west of Delta, Pa., where it is to connect with the proposed York & Schuylkill Railroad, which is to be operated and controlled by the same company. The entire road in Maryland and Pennsylvania is to be about 135 miles long.

**Bentonville, Pineville & Northwestern.**—This recently chartered road is to be about 16 miles long and will commence at the town of Caverna on the Arkansas State line, extending through McDonald County in Missouri northwesterly to Lanigan on the Kansas City, Pittsburgh & Gulf road. A. C. Walters and J. W. Shields, of Pineville, Mo., and W. D. Manck, of Bentonville, are the incorporators.

**Cedar City Terminal.**—This is a new company recently incorporated in Utah, for the purpose of constructing a line from Cedar City, Iron County, to the coalfields east of that city.

**Cheat River.**—The recent meeting of stockholders at Pittsburgh, Pa., resulted in the re-election of W. S. Guffy, of Pittsburgh, as President. The officers reported that it was the intention to begin work on the road in the spring. It is to extend from the mouth of Cheat River, in West Virginia, connecting with the Pittsburgh, Morgantown & Fairmont, to the headwaters of the Cheat River, near Rowlesburg, there to connect with the Baltimore & Ohio.

**Chesapeake & Ohio.**—The branch of this road from Gauley Bridge to Twenty Mile Creek and six miles up the valley of that stream is almost completed. The branch is 20 miles in length, and opens a splendid region of coal and timber.

**Chicago North Division Elevated.**—Articles of incorporation were filed last week in Illinois. The incorporators are Marcus Pollasky, Frederick W. Gardener, Andrew McNally, L. O. Goddard, James Hall and William S. Smith, Chicago, and W. W. Tracy, Springfield. It is proposed to build a road extending from Congress street north to the city limits of Chicago.

**Cincinnati, Union City & Chicago.**—McNair & Bracey, of Chicago, have the contract for building the 80 miles of this road from Huntington to Union City, Ind., and it is said that a good deal of work will be done on the construction of the road in the spring. The contract for work near Huntington has been let to Fisher, Keefer & Bailey, of that town. J. C. Fawcett, of Louisville, is President.

**Clayton & Creve Cœur.**—This company has filed articles of incorporation in Missouri. It proposes to construct a railroad from Clayton to an intersection with the Creve Cœur branch of the Missouri Pacific at Chapman Station. The incorporators are: Henri Chomeau, Phil Deuser, W. B. Greensfelder, H. M. Smith and Jacob Studt. The proposed line is less than 10 miles in length.

**Duluth, Nepigon & James Bay.**—This company is applying to the Dominion Parliament for power to construct a line from Nepigon, on Nepigon Bay, Ont., in a northeasterly direction to a point on James Bay, near the mouth of the Albany River.

**Florence & Cripple Creek.**—Nearly 2,000 men are at work upon the construction of the line. The roadbed is now ready for the rails for a distance of 14 miles north of Florence, Col., and rails fof 10 miles are now upon the ground. The bridge across the Arkansas River is now passable for construction material. The projectors hope to get into Cripple Creek by April 15, but probably will not reach the camp until June or July. There will be one short tunnel and any amount of sharp curves, some of which are 32 deg.

**Frederick & Middletown.**—The bill to incorporate this company before the Maryland Legislature gives the company power to build a road to be operated either by steam locomotives or by electricity. The length of road is not given, but Frederick and Middletown, the towns mentioned in the title, are about 10 miles apart. The incorporators are Messrs. Peter H. Bussard, D. Edward Kefauver, Peter W. Shafer, H. Coblentz and Herman L. Routzahn, of Middletown, and G. W. Smith, Dr. U. A. Sharetts, T. H. Haller and C. V. S. Levy, of Frederick.

**Glendon & Gulf.**—The bridge across Deep River on the line of this road near Glendon, N. C., was completed last week and the railroad is now ready for operation for the 13 miles between Gulf and Bellville, a town a few miles beyond Glendon. This is as far as the road will be built at present, but it is intended to ultimately extend it toward Charlotte.

**Great Salt Lake & Hot Springs.**—The stockholders annual meeting was held in Salt Lake City recently, when it was announced that arrangements had been made for the further extension of the line beyond the dresent terminus. The new work will be about eight miles long and will bring the road to Kaysville. The General Manager, Simon Bamberger, reports that this will be the only work undertaken for some time. The long proposed extension to Coalville, Utah, about 50 miles from Salt Lake City and the location of some good coal mines, is still in view.

**Holly River Lumber Co.**—The standard gage railroad from a connection with the West Virginia & Pittsburg Railroad, at the mouth of Holly River, near Sutton, W. Va., has been completed to its saw mill plant, four miles up the Holly River, in Braxton county. The company has completed a saw mill with a capacity of 50,000 ft. per day, and it owns 16,000 acres of timber land. The road is to be continued from the mill plant into the timber owned by the company, 11 miles. Work on this part of the line is well under way, and will be completed in the spring.

**Intercolonial.**—The proposed Dartmouth branch which the Dominion Government has decided to construct will be about 10 miles long and will leave the present line to Halifax at Windsor Junction, taking a more southerly route than the present line and rejoining it just above Dartmouth. The town of Dartmouth is opposite Halifax and has been reached by a branch line which crossed the "Narrows" of the Halifax River by a trestle bridge. That bridge has been wrecked twice, the last time in July, 1892, and it has not since been rebuilt.

**Kingston & Ottawa.**—The engineers who are locating this line have returned from the survey. The party finished work for the winter near Elgin, 34 miles from Kingston, Ont., after laying out two routes. At a few points there will be some rock excavation, and a contract was some time since let for the work at Blakes, the most serious cutting on the line.

**New Roads.**—J. L. Long has been appointed the engineer to make the survey for a proposed road from Rusk, Tex., west to Palestine or a point near that town, on the International & Great Northern. This line will be a continuation of the road now being built by the Texas State Board of Penitentiaries from the penitentiary at Rusk to timber lands a few miles from that town. This road has been graded for about three miles, and at present 100 convicts are at work.

A survey for a railroad from Colorado Springs to Cripple Creek, by way of Bear Canon, has been made. The route is about 25 miles long. In crossing the divide between Bear Creek and Four-Mile Creek a grade of 12 per cent. is encountered. It is proposed to use a modification of the Abt system for this portion of the line. The survey was made for Colorado Springs business men, who hope to induce capital to take hold of the proposition.

**Norfolk & Western.**—Engineer Commissioner Barell, of the District of Columbia, has made a favorable report upon the bill pending in the United States Senate to authorize the railroad to extend its line into the city of Washington, D. C.

**Ottawa, Arnprior & Parry Sound.**—M. J. O'Brien, of Renfrew, Ont., will commence work next week on his contract west of Killaloe, beyond Eganville, the present terminus of the road.

**Pan American.**—The track on this road from Victoria, Tex., to Guadaloupe River, 10 miles south of that town, is now being taken up and will be used in the extension of the Gulf, Beaumont & Kansas City road, to which the rails have been sold. This 10 miles of road was built in 1892, and was to be part of a long line to the Mexican boundary line, which we believe was even intended to be built across Mexico to the Pacific Ocean. The projectors, however, never completed the 11th mile of the projected road. An attempt on the part of the town of Victoria to prevent the abandoning of the railroad by an injunction of the District Court failed of its object and the rails are now being taken up.

**Santa Fe, Prescott & Phœnix.**—It is expected that 20 miles of this line south of Prescott, Ariz., will be in operation by April, and the road will be completed to Phœnix by November. Trains are now running from Ash Fork, on the Atlantic & Pacific, south to Prescott, 60 miles.

**South Jersey.**—The completion of the relocation of the Cape May branch by Chief Engineer Lutz is now reported. The contract was given out some weeks ago to E. A. Tennis, and he has now a number of men employed near Tuckahoe Junction, N. J., where the branch leaves the present line. The title to this branch has only recently been secured through the purchase of the property from the Receiver, Robert P. Wilson, which sale has been confirmed by the Chancellor's Court of New Jersey. The road is practically graded from Tuckahoe to within two miles of Cape May. Portions of the line will be rebuilt and the entire work finished by April next.

**Temiscouata.**—The present terminus of this road is now at Edmunston, N. B., where a connection is made with the old New Brunswick road, now operated by the Canadian Pacific. It is now proposed to extend the line from that point or from Conners, on the St. John River, south about 30 miles, to connect with the Bangor & Aroostook Railroad. Van Buren is the projected northern terminus of that railroad, which has now been completed to Houlton and is about 60 miles north of that town. If the latter line is extended to Van Buren during the summer, as expected, the branch of the above road to meet it will undoubtedly be undertaken and completed by the time the Aroostook line reaches Van Buren.

**Washington & Chesapeake Beach.**—A force of graders is now working at the eastern terminus of this line near Chesapeake Bay under Contractor E. G. Parish. Coffin & Sullivan, who have the contract for the entire line between Chesapeake Bay and Washington, D. C., 30 miles, expect to have the work completed by July.

**Western Maryland.**—The contract for the extension of the Baltimore & Harrisburg from the present terminus of the road, in West York to George street, York, Pa., and within a short distance of the centre of the city, has been awarded, and work on the extension will begin in a short time. Considerable cutting and filling will have to be done on both sides of Codorus Creek, and the creek bridged.

**Wheeling Bridge & Terminal.**—This company has had considerable trouble settling with the property

holders of Benwood, W. Va., and has been delayed in getting to work below the Ohio County line. The road is completed and ballasted as far as the dividing line between Ohio and Marshall counties, W. Va., which is also the dividing line between Wheeling and Benwood. Below this point the piles are driven, and only the demands of the property owners stand in the way. Last week a settlement was made with a part of these, and the work can now go on uninterrupted as far as Boggs' Run, about halfway to the Riverside Iron Works, the objective point. Below the Riverside plant, it is proposed to continue the line to the steel works of the Wheeling Steel & Iron Co. This work will not be commenced till the upper part of the line is completed.

**Wheeling & Elm Grove.**—This company, which operates a railroad between Wheeling, W. Va., and Elm Grove, W. Va., has decided to extend its line from Elm Grove to Triadelphis, a distance of seven miles. Work is to begin in the early spring. The new line will follow the valley of Wheeling Creek, crossing that stream on a steel girder bridge.

**White Day Land & Transportation Co.**—This company, which is a Pennsylvania corporation, last year purchased 1,500 acres of coal and timber land, located in Marion, Monongalia, and Taylor counties, West Virginia. It is the intention to build a railroad the coming summer to open the land. Two routes have been surveyed. One begins at Opekiska, on the new Pittsburgh, Morgantown & Fairmont road, and the other at Irontown, Taylor county, on the Baltimore & Ohio. The former will be 17 miles in length, and the latter about 20 miles. The latter is considered the more feasible, on account of the easy grades. Ten members of the company made a trip over each route last week, and will decide within a few weeks which line to accept.

## GENERAL RAILROAD NEWS.

**Albemarle & Raleigh.**—Vice-President W. G. Elliott, of the Wilmington & Weldon, announces the formal consolidation of the Albemarle & Raleigh with that line. The road has always been operated as part of the Seaboard Air Line System. In the last few years several extensions have been made and it is now 52 miles long, extending from Tarboro to Plymouth, with a branch to Washington 25 miles long. It will hereafter be operated as part of the Tarboro Branch of the Wilmington & Weldon.

**Central Pacific.**—C. P. Huntington appeared before the United States Senate Committee on Pacific Railroads, at Washington, this week, and spoke in relation to the extension of the government's Pacific Railroad debt. He submitted a bill proposing terms for the adjustment of the debt. It provides for an issue of $134,000,000 2½ per cent. 125-year bonds. These are to be applied first to the replacement of the bonds of the Central Pacific and of the Western Pacific Railroad Company, amounting to $27,853,000, and also to the redemption of bonds issued on account of the California & Oregon Railroad Company.

**Chickamauga & Durham.**—Paul J. Murphy has been appointed Receiver of the Chickamauga Coal & Iron Company and the Chickamauga & Durham Railroad by Judge Newman, of the United States District Court at Chattanooga. The application was made by the Central Trust Co , of New York, trustee for $600,000 of the bonds of the Coal & Iron Company, on which there has been two defaults of interest, in July, 1893, and January, 1894. There was no opposition to the application. The railroad is 17 miles long, from Chickamauga to Durham, Ga., and was built in 1892. The Receiver has been Superintendent and Treasurer of the road.

**Colorado Midland.**—J. W. Reinhart, J. J. McCook and J. C. Wilson, the Receivers of the Atchison, Topeka & Santa Fe, were appointed also Receivers of the Colorado Midland Railroad by the United States Court in St. Louis on Feb. 1.

**Delaware & Hudson Canal Co.**—The managers of the company have decided to ask the stockholders to authorize at the annual meeting in May an additional issue of $5,000,000 of stock. This new stock is to be offered to stockholders at par, and the proceeds will be used in paying off the debenture seven per cent bonds, amounting to $4,829,000 which fall due on Oct. 1 next.

**Duluth & Manitoba.**—The Receivers of the Northern Pacific road having abrogated the 50-year lease of this road, the bondholders have appointed a committee to protect their interests. The Duluth & Manitoba was placed in the hands of Receivers about the same time that the Northern Pacific was forced to that step. The committee appointed consists of Charles S. Fairchild, Johnston Livingston, Hugh L. Cole and James Lenox Banks, of New York City; and Charlemagne Tower and Evens R. Dick, of Philadelphia.

**Kansas City, Wyandotte & Northwestern.**—The confirmation of the foreclosure sale of this road, which took place at Kansas City last month, will be opposed before Judge Caldwell in the United States Circuit Court by a number of the creditors. The road was purchased for $650,000 by G. C. Smith, formerly General Manager of the Missouri Pacific, and Bailey Waggener, an attorney of that company, representing the Reorganization Committee, and that amount is only sufficient to pay a small portion of the claims against the property.

**Lehigh Valley.**—It was announced last week that the company had arranged to reduce its floating debt by about $500,000 through funds secured by the sale of what are known as the Newark water bonds. The railroad owns half the stock of the East Jersey Water Company, which received a few years ago the four per cent. bonds of the city of Newark amounting to $3,500,000 given in part payment of the water works of that company purchased by the city. The bonds were sold in New York recently and it is stated that the amount which will be payable to the railroad company by the sale will be $1,700,000.

**New York Central & Hudson River.**—The following table shows the earnings and expenses of this road for the three months ending Dec. 31 and for the six months ending Dec. 31:

| *Three months to Dec.* 31. | 1893. | 1892. | Inc. or dec. |
|---|---|---|---|
| Miles operated | 2,334 | 2,096 | I. 238 |
| Gross earnings | $11,827,911 | $12,199,284 | D. $371,373 |
| Oper. exp | 8,049,330 | 8,317,554 | D. 268,224 |
| Net earn | $3,778,581 | $3,881,730 | D. $103,149 |
| Fixed charges | 2,583,769 | 2,455,906 | I. 127,863 |
| Balance | $1,194,811 | $1,425,823 | D. $231,012 |
| Dividend | 1,117,853.75 | 1,117,853.75 | |
| Surplus | $76,958 | $307,970 | D. $231,012 |

| *Six months to Dec.* 31. | 1893. | 1892. | Inc. or dec. |
|---|---|---|---|
| Gross earn | $24,039,759 | $24,265,880 | D. $226,121 |
| Oper. expen | 16,317,419 | 16,716,074 | D. 398,655 |
| Net earn | $7,722 340 | $7.549,806 | I. $172,534 |
| Fixed charges | 5,213,618 | 4,964,126 | I. 249,492 |
| Balance | $2,508,722 | $2.585,680 | D. $76,958 |
| Dividend | 2,235,707 | 2,235,707 | |
| Surplus | $273,015 | $349,973 | D. $76,958 |

**New York & New England.**—Judge Townsend, of the United States Circuit Court in New Haven, has appointed Messrs. T. C. Platt and Marsden J. Perry Receivers of the railroad company, and has discharged the temporary Receiver, William T. Hart, who was appointed at the preliminary hearing temporary Receiver for the Connecticut district.

**Ohio Valley.**—In the United States Court at Louisville, Ky., the Central Trust Co., of New York, has filed an application for the foreclosure of its mortgage on the bonds of the railroad, and asked that an additional receiver be appointed at once pending foreclosure and the sale of the road. In July, 1886, $1,470,000 of first mortgage bonds were issued, and in July, 1888, $2,395,000 more were issued to secure the first issue. Only a part of these having been disposed of, the Central Trust Co., as trustee, asked for the sale of the road to secure all holders.

**Pennsylvania.**—The statement of the business of all lines east of Pittsburgh and Erie for December, 1893, as compared with the same month in 1892, shows a decrease in gross earnings of $632,078, a decrease in expenses of $816,556, an increase in net earnings of $184,478. The twelve months of 1893, as compared with the same period of 1892, show a decrease in gross earnings of $2,466,620, a decrease in expenses of $1,823,344, a decrease in net earnings of $643,276. All lines west of Pittsburgh and Erie for December, 1893, as compared with the same month in 1892, show a decrease in gross earnings of $707,392, a decrease in expenses of $481,880, a decrease in net earnings of $225,511. The twelve months of 1893, as compared with the same period of 1892, show a decrease in gross earnings of $1,227,186, a decrease in expenses of $877,435, a decrease in net earnings of $349,751.

**Sanford & St. Petersburg.**—This company has been organized to succeed the Orange Belt Railroad, and the formal transfer of that property to the new company was made on Jan. 1 last. No important changes are made in the officers of the company, E. T. Stotesbery continuing as President and William McLeod as Vice-President and General Manager with office at Oakland, Fla. The company operates a line from Sanford southwest across the State of Florida to St. Petersburg on Tampa Bay, a distance of 152 miles.

**South Carolina.**— The committee for the first consolidated six per cent. mortgage bondholders of the company have sent out a circular which is in part as follows: By virtue of a decree of the Circuit Court for the District of South Carolina, the railroad is to be sold at public auction in Charleston, S. C., on April 12, next, the minimum bid provided being $1,000,000. It is to the interest of the junior security-holders to purchase the property at the lowest possible figure, while the interest of the first consolidated six per cent. mortgage bondholders demands that they should purchase it themselves rather than allow the property to be sold for less than the amount of the first consolidated mortgage and accumulated interest and prior liens and charges. The committee considers the property amply worth the full amount of the first consolidated mortgage with interest and all prior charges. Bondholders are requested to deposit their bonds with the New York Guaranty & Indemnity Co.

**Texas, Louisiana & Eastern.**—Judge Bryant, of the United States Court at Sherman, Tex., has appointed Z. Lazarus, of Sherman, and C. M. Putnam, of Chicago, joint Receivers of the railroad.

**Wabash.**—The earnings of the road for December, and for the six months ending Dec. 31, 1893, as compared with those of the same periods in 1892, were as follows:

| | 1892. | 1893. | Dec. |
|---|---|---|---|
| *December:* | | | |
| Gross earn | $987,602 | $1,151,958 | $164,356 |
| Oper. expen | 877,122 | 913,053 | 35,931 |
| Net earn | $110,480 | $238,905 | $128,425 |
| *For six months:* | | | |
| Gross earn | $7,216,103 | $7,686.386 | $470,283 |
| Oper. expen | 5,551,177 | 5,657,570 | 106,393 |
| Net earn | $1,664,926 | $2,028,816 | $363,890 |

**West Virginia Central & Pittsburgh.**—In reply to a question as to the truth of the report that the company had in preparation a new offer to the city of Baltimore for the Western Maryland Railroad, President Henry G. Davis said last week that the matter had not been presented to either the stockholders or directors, and that no offer was under contemplation. He further said the proposition for purchase made two years ago was not now open, and that if any new negotiations were considered they would have to rest upon an entirely different basis. Other arrangements for an Eastern outlet had been made which are entirely satisfactory. As to what the future might develop, in case Baltimore City should make a proposition, he could not say.

## TRAFFIC.

### Traffic Notes.

Onyx in carloads has been reduced to 50 cents, C. L., from Utah points to the Missouri River. We are glad to see that the railroads make concessions on the necessaries of life these hard times.

It is reported that the contract between the Panama Railroad and the North American Navigation Company for through freight rates between the Atlantic coast and San Francisco, which lately expired, has been renewed.

The Lehigh Valley, which has recently made a traffic agreement with the New York, New Haven & Hartford, has opened an office in New Haven, Conn. The agent, Mr. L. W. Frost, has heretofore been agent for the Lehigh Valley at Boston.

It appears that there are now four lines of second-class sleeping cars from Boston to the Pacific coast: one over the Boston & Maine and Grand Trunk; one by the Boston & Maine and Canadian Pacific; one by the Fitchburg and the Erie, and one by the Fitchburg and the West Shore.

Among the other indications of improved business conditions is the statement of the Superintendent of Dining Cars on the Lake Shore and Michigan Southern, who says that his business is picking up rapidly. He finds that the tastes and demands of passengers in this respect are an infallible barometer.

### Chicago Traffic Matters.

CHICAGO, Feb. 7, 1894.

The sensation of the week has been the summoning of President Newell and Freight Agent James, of the Lake Shore; President Roberts, of the Pennsylvania; Commissioner Blanchard and other officials of the Central Traffic Association; Traffic Manager Reeve, of the Chicago & Grand Trunk and Local Freight Agent Cooper, of the Lackawanna, to appear before the Federal Grand Jury here and give evidence respecting alleged violations of the Interstate Commerce law. The investigation, which is somewhat of the nature of a "drag-net" affair, is being conducted by Attorney Safford, representing the Interstate Commerce Commission. The summoning of Presidents Newell and Roberts and Traffic Manager Reeve is said to be on account of the recent published interview with Mr. Newell, in which he acknowledged having found the other roads violating the law and having given instructions to his own subordinates to meet the competition. It is not probable, however, that either of the gentlemen will give any material evidence before the Grand Jury which will be sufficient to secure indictments on. The hearing has been postponed until to-morrow.

The General Passenger Agents of the Central Traffic Association after struggling with the proposed passenger agreement for a week have been unable to agree upon the groups and percentages and have referred the subject back to the general managers for further instructions.

A conference of representatives of the Western Passenger Association lines and the trans continental lines has been in session for several days endeavoring to agree upon basing rates for North Pacific Coast points made necessary by the recent changes adopted by the Northern Pacific and Great Northern. The conference has now adjourned until to-morrow to allow the rate clerks time to line up the rates on the new basis and report. The Santa Fe wants its disagreement with the Southern Pacific settled before agreeing to any basis via the Northern routes.

The General Managers have propped up the anti-pass agreement and have given it a new lease of life, so they say.

The Northwestern lines have been for some time complaining to Chairman Midgley that the Wisconsin Central was violating the agreement entered into by the Western Freight Association Jan. 8 by which grain rates west and east of Minneapolis were to be arrived at by pro-rating per locals east and west of Minneapolis on grain coming from the West through that point destined to Chicago and East. This agreement fixed the rate from Minneapolis to Chicago at 12½ cents per 100 lbs. as a proportional rate. The Wisconsin Central has been using a 10-cent rate arrived at as a proportion of the through Northern Pacific rate. Chairman Midgley now rules that while the Wisconsin Central and Northern Pacific were one line it was immaterial how they divided the through rate between themselves, but now that they are operated independently the Wisconsin Central must conform to the 12½-cent rate, and that the unauthorized 10-cent rate must be terminated to-day.

The Western Passenger Association has authorized its chairman to form local associations, under the agreement, in Boston and New York in order to the better handle the westbound commission question.

An official committee of the Western Freight Association, consisting of representatives from the Missouri Pacific, Kansas City, Fort Scott & Memphis, Chicago, Milwaukee & St. Paul, Chicago, Rock Island and Pacific and Chicago, St. Paul, Minneapolis & Omaha, will go to Washington, Feb. 12, in response to an invitation from the Interstate Commerce Commission, to make suggestions respecting the publication of tariffs under the law. Several other lines will send representatives of their own.

The freight committee of the Central Traffic have agreed to a reduction in rates on iron and steel articles in Central Traffic association territory to the basis of 6th class in carloads and 5th class l. c. l., effective Feb. 5, and will recommend the same to the Trunk lines.

General Passenger Agent Heafford, of the Chicago, Milwaukee & St. Paul, denies the report that his company is intending to discontinue the dining car service between St. Paul and Chicago.

The Union Pacific has announced that it would double the commissions paid by it on eastbound passenger business from North Pacific coast points.

An agreement has been made between the Rock Island, Illinois Central, Wabash, Santa Fe, Alton, Chicago Great Western, Burlington and Milwaukee & St. Paul not to accept exchange orders after Feb. 15 in connection with tourist tickets from points in the West and Northwest to points in the South, Southeast and Southwest. This is done to prevent scalping through improper use of such orders via Chicago.

Considerable comment is occasioned here by reason of the active participation of Edward A. Moseley, Secretary of the Interstate Commerce Commission, in the attack of the labor organizations upon the recent injunction orders granted by Judge Jenkins in connection with the receivership of the Northern Pacific, and formulated in the resolutions of investigation introduced on Monday last by Congressman McGann.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines, for the week ending Feb. 3 amounted to 43,722 tons, against 58,004 tons during the preceding week, a decrease of 14,282 tons, and against 78,615 tons for the corresponding week last year. The proportions carried by each road were:

| Roads. | W'k to Feb. 3. | | W'k to Jan. 27. | |
|---|---|---|---|---|
| | Tons. | P. c. | Tons. | P. c. |
| Michigan Central | 4,160 | 9.5 | 4,307 | 7.4 |
| Wabash | 1,818 | 4.2 | 4,151 | 7.2 |
| Lake Shore & Michigan South. | 7,484 | 17.1 | 8,747 | 15.1 |
| Pitts., Ft. Wayne & Chicago | 5,188 | 11.9 | 5,111 | 8.8 |
| Pitts., Cin., Chicago & St. Louis | 7,336 | 16.8 | 12,318 | 21.1 |
| Baltimore & Ohio | 1,749 | 4.0 | 2,964 | 5.3 |
| Chicago & Grand Trunk | 3,364 | 7.7 | 6,437 | 11.1 |
| New York, Chic. & St. Louis | 4,886 | 11.1 | 4,692 | 8.1 |
| Chicago & Erie | 6,155 | 14.1 | 7,093 | 12.1 |
| C., C., C. & St. Louis | 1,582 | 3.6 | 2,184 | 3.8 |
| Totals | 43,722 | 100.0 | 58,004 | 100.0 |

Of the above shipments 3,623 tons were flour, 15,111 tons grain and millstuff, 9,486 tons cured meats, 9,103 tons dressed beef, 1,275 tons butter, 1,197 tons hides and 2,840 tons lumber. The three Vanderbilt lines carried 37.7 per cent., the two Pennsylvania lines 28.7 per cent.

*(Other Chicago traffic news will be found on page 103).*